



FRIDAY, MAY 22, 1903.

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## Contributions

## Barrett Jacks.

Allegheny, Pa., May 19, 1903.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

During the past week we have received a permanent injunction restraining the Buckeye Jack Manufacturing Company, agents et al., from selling their product, which is an imitation of the Barrett jack, by fraudulent methods, such as using our advertising matter, and our catalogue, verbatim, even to the using of the same type. These makers of imitation jacks have gone so far as to attempt to sell their product, as being the original Barrett jack, and the court has emphatically enjoined them. In all these instances we have received a broad injunction by the United States Circuit Court of the Southern District of New York. Judge Lacombe was emphatic in his order restraining these people, and the decision was arrived at without leaving the bench, in 15 minutes.

The makers of imitation Barrett jacks, on which the patents have expired, can only manufacture a few sizes of the same, and the patents on the other sizes of Barrett jacks are still good.

THE DUFF MANUFACTURING COMPANY.

## Adhesion and Wheel Arrangements.

Philadelphia, Pa., May 12, 1903.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

In Mr. Cheney's letter, published in the issue of May 8, the 4-6-0 locomotive of the C. R. R. of N. J. is criticized because of the limited weight on drivers, and it is implied that this condition would be improved by substituting the 2-6-2 wheel arrangement. As a matter of fact, this would not increase the adhesive weight, neither would it improve the general design; because the locomotive referred to has a wide shallow fire-box for burning anthracite, and the grate can easily be placed above the 69 in. drivers. The wheel loads on this engine were limited, and to get the required boiler power, 10 wheels were necessary to carry the weight; and as the tractive factor is 4.8, it is evident that the engine has ample weight on the drivers.

Mr. Cheney commends the 2-6-2 locomotives of the Lake Shore, and rightly so, for they are very fine machines. But it should be remembered that about a year before they were built, the Lake Shore brought out some 4-6-0 engines which had practically the same total weight, the same weight on drivers and the same tractive power, as the 2-6-2 design. The only reason for adopting the latter wheel arrangement was to accommodate the fire-box; the grate area of the 10-wheelers being rather insufficient, and the drivers being too large to enable the grate to be placed above them. Similar considerations led the Santa Fe to adopt the 2-6-2 wheel arrangement on their latest passenger locomotives.

The writer has in mind a well-known road which, a few years ago, secured, from the same builder, some 2-6-0 and 4-6-0 locomotives. The former had a tractive factor of 4.48, and the latter of 5.09; in other words, the 2-6-0 engines were more liable to slip.

Mr. Cheney's criticism of the 4-8-0 locomotive is more reasonable, as an eight coupled engine usually, having small drivers, needs all the adhesive weight available in order to prevent slipping. The 4-6-2 type, however, strikes me as admirable where a six-coupled engine of very high steaming capacity is wanted. Surely we must all acknowledge the very fine work done by many 4-4-2 engines, in spite of the fact that they have a four-wheel leading truck.

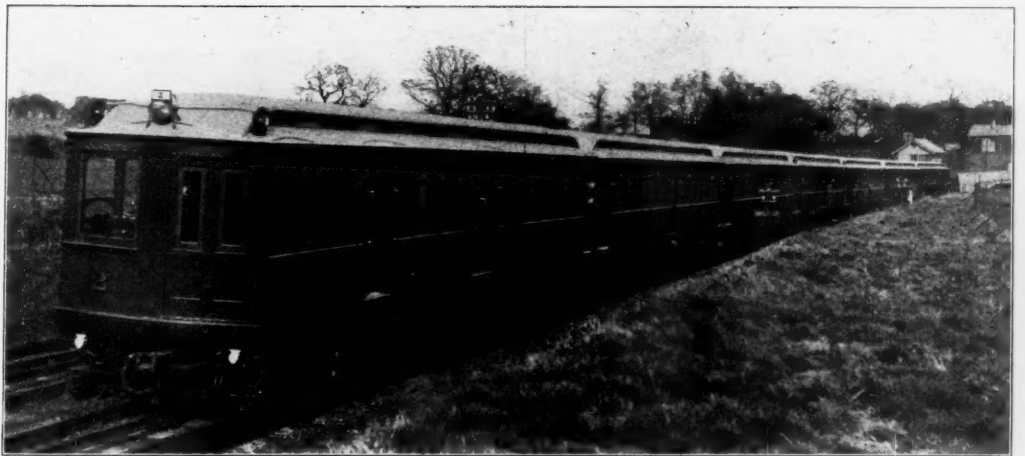
The most important thing is to get a proper ratio between the weight on drivers and the tractive effort. For a freight locomotive, 4.5 is by no means too large; but in fast passenger work, 4.0 is quite admissible, and even a lower value is sometimes used to advantage. Trailing wheels are allowable when the design of the boiler requires their use; otherwise they are unnecessary, even though a four-wheel leading truck must be used in order to distribute the weight.

PAUL T. WARNER.

## Incandescent Gas Lighting for Cars.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

The Eastern Railway of France after experiments covering 18 months have succeeded in obtaining satisfactory and economical results in lighting their passenger cars with gas burners using incandescent mantles of the Welsbach type. These results were obtained with an oil-gas mixed with acetylene and with coal-gas. A complete account of the experiments leading to success is given in the *Revue Générale des Chemins de fer* for May. The burners used at first were given an elastic support with the idea of protecting the mantles from shock, but this proved unsatisfactory, and in the most successful type the burner and mantle are rigidly joined to the lantern. During 10 consecutive months 22 passenger compartments were lighted without a single accident, with a production of twice the light given by the ordinary regenerative burner, and at the same time a reduction of



Experimental Electric Train on the Metropolitan District Railway, London.

40 per cent. in the gas consumption. The coaches on which the experiments were made were not chosen specially to give easy riding. It is therefore remarkable that the mileage of the mantles often exceed the mileage of the tires between turnings.

The experiments have shown that compared with the previous gas-lighting system the light given can be doubled by the use of incandescent mantles without increasing the cost, and, in fact, it is probable that a slight economy will be effected. The cost of a mantle is from 7½ to 8½ cents, and its average life is about 400 hours, during this time it saves 40 per cent. of the gas, or say 0.35 cu. ft. per hour, giving a total saving of 140 cu. ft. of gas at 32.3 cents per hundred cu. ft., or say 45.2 cents.

LAWFORD H. FRY.

## Underground Railroad Electrification in England.

London, England, May 7, 1903.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

The accompanying photograph represents one of two trains which are now making experimental trips on an outlying portion of the Metropolitan District Ry. of London as a preliminary to the complete electrification of that road by the Yerkes syndicate—the Underground Electric Rys. Co. of London. The cars composing the trains have been built from American designs by the Brush Electrical Engineering Co. of Loughborough, England, the work being supervised by Mr. Chapman, chief engineer and general manager of Mr. Yerkes' lines. The train shown in the photograph is fitted with the Westinghouse electro-pneumatic system of train control, and the other train by the Thomson-Houston (or General Electric) system, which embraces the Sprague patents. The results of the trials now being made with these trains on the Ealing and South Harrow section of the District Ry. will decide which system of train control shall be adopted on the system generally. A small power house has been erected for these trials, as the big generating station, which the Yerkes' Company are erecting at Chelsea, is still far from completion. Mr. Potter, of the General Electric Company, who represented that concern in the recent trials held by the New York Rapid

Transit Company, is in England assisting the British Thomson-Houston Co. in the District Ry. trials.

The Westinghouse Co. have this week completed the electrification of the Mersey Railway at Liverpool, the whole of the trains of which are equipped with their system of control, while the Thomson-Houston Co. have several trains fitted with their system in use on the Central London Ry., and have obtained the entire contract for equipping that line with the multiple-unit system in place of the heavy locomotives originally employed. The Thomson-Houston Co. have also secured the contracts for the Great Northern and City "tube" railroad (London), and also for the Newcastle lines of the North Eastern Ry., which are undergoing electrification. The trials on the District Ry. are being watched with keen interest in British railroad circles, and their result is likely to decide the equipment of several other lines which are about to be electrified.

It will be seen from the photograph that the cars of the District trains have middle side doors as well as end doors. These side doors slide, and they are provided with handles, so that they can be worked either from within the car or from the station platforms. Experience is to decide whether they shall be used at every station or treated as emergency doors and for emptying the trains quickly at the city terminals in the rush hours. At present the District Ry. is operated by compartment side door cars of the standard British type, but the new equipment for the electrical working is, it is understood, to be wholly of the American open car pattern. British officials criticize this type of car for urban and suburban service because of its small seating capacity as compared with compartmental carriages. The new District cars, which are each 50 ft. long, have seats for 48 passengers only in the trailer cars and for a few less in the motor cars. This is quite 25 per cent. less seating accommodation than is provided in an ordinary suburban British type railroad carriage of the same length, divided up into compartments. The designers of the District cars

frankly say that they intend at least this percentage of the passengers to stand, and a broad corridor runs between the seats with pendant straps to assist standing travelers. There is, of course, a good deal of standing in English suburban and urban trains, but it is not supposed to be recognized by the authorities, and passengers who have secured seats have been held in law to have the right to exclude others desiring to stand, after the full seating complement has been made up. However, the Central London Ry. has already brought about some modification of British habits in this respect, and Mr. Yerkes and Mr. Chapman are confident that, if the Londoner be given real rapid transit he will not object to "stand and let stand," as occasion requires. Of course, standing passengers in the new District cars will inconvenience those seated much less than they do in the present compartments, many of which are so narrow that the knees of those seated opposite one another almost touch. As regards the question of class distinctions, no final decision has been arrived at, but in these experimental trains all the cars are the same as regards the quality of their internal fittings. This indicates that on the electrified Underground Ry. no distinction except "smoking" and "non-smoking," as is the case on the "tube" lines, will be made. At present, of course, there are three classes of carriages on both the Metropolitan and the District. On the electrified Mersey Ry. two classes of carriages have been retained.

A novelty in British practice is the introduction into these District trains of electric heaters. These are of the American "Consolidated" type, and there are 16 in each car, placed under the seats. There is some doubt felt as to whether the British public will care to have their suburban trains heated, as there is a great objection to stuffiness on the part of most passengers. The steam heating which has been introduced on many long distance trains is by no means popular in England, and many travelers declare their preference for the old-fashioned tin foot warmer and a rug. Altogether, the Metropolitan District electrified trains introduce a number of departures from established British practice and their future is being followed with keen interest here.

CHARLES H. GRINLING.

### Good Roads in Massachusetts.

In accordance with the provision of the act of April 10, 1901, \$100,000 became available for the uses of the Highway Commission for building and maintaining State highways in Massachusetts on Jan. 1, 1902. On April 1, 1902, the Massachusetts Legislature appropriated \$500,000 for the same purpose, with the condition that \$100,000 of this sum should hold over until Jan. 1, 1903. The commission, therefore, has had \$500,000 to work with during the past year. In 1902 additional layouts were made, aggregating over 53 miles, bringing the total of State highways up to 431 miles. Approximately 57 miles of road were completed during the year. The commission has divided Massachusetts into three divisions in order to become better acquainted with existing conditions in all parts of the State, and held 65 meetings in Boston during 1902, besides many others at different points. Adjusting roadways in connection with lines of electric roads upon them, to give the maximum good with the minimum cost, has required much study and many conferences between the commission and the officers of the different electric companies. There appears to be a growing inclination on the part of the electric road officials to do better work, and the friction has been no more than would naturally be expected between two interests so divergent and yet so closely allied to each other.

In accordance with the provisions of the statutes, the several counties in which State roads are built are required to pay the State one-quarter of the cost. The

although on some less traveled ways the width is reduced to 12 ft. Ten ft. has proved too narrow, particularly on roads built on sand, as the shearing effects of the wheels reduce the width of the macadam below the safety limit.

No telford foundations have been laid during the last two or three years. Much of this kind of work had been done by the commission, and every contingency was supposed to have been carefully considered, but results from the use of telford have been very unsatisfactory. In a few cases the large stones have come to the surface in a manner which would seem to indicate a movement due to frost action. In other cases, where a fairly soft native stone was used for surfacing, the upper courses were worn away so as to leave the large stones exposed. There are few, if any, cases where equally good results cannot be obtained by the use of sand, gravel, or small stones, in place of telford, and at a less cost.

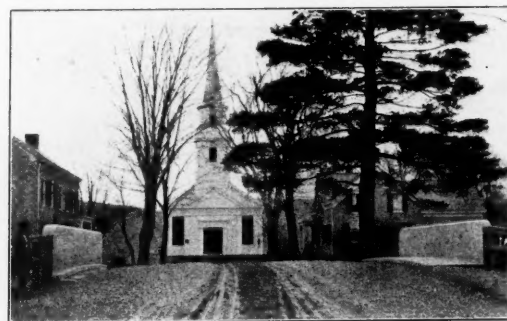
During the past year the commission has experimented quite extensively with the use of reinforced concrete in culverts and short bridges, in place of rubble masonry. By the use of this concrete a saving of from 25 to 40 per cent. has been effected, while the resulting structure is more pleasing to look at as well as more enduring.

The report is signed by W. E. McClintock, Harold Parker and John H. Manning, Commissioners.

### Rail-Concrete Masonry on the New York, Ontario & Western.

The New York, Ontario & Western is now making considerable use of concrete masonry built on a foundation

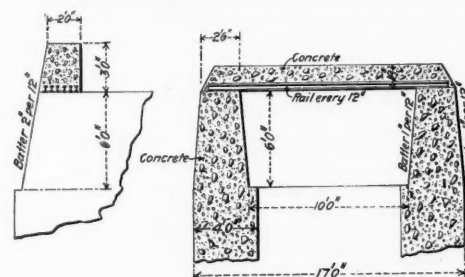
channels, when placed on the rough bridge seat, could be blocked to any position. Twenty-five foot rails offer a chance for vibration, so stiffness was insured by con-



Hurley Bridge at Street Level.

necting the rails, with inch rods, which also served to give some lateral stiffness.

The lagging for the bridge floor was put in flush with



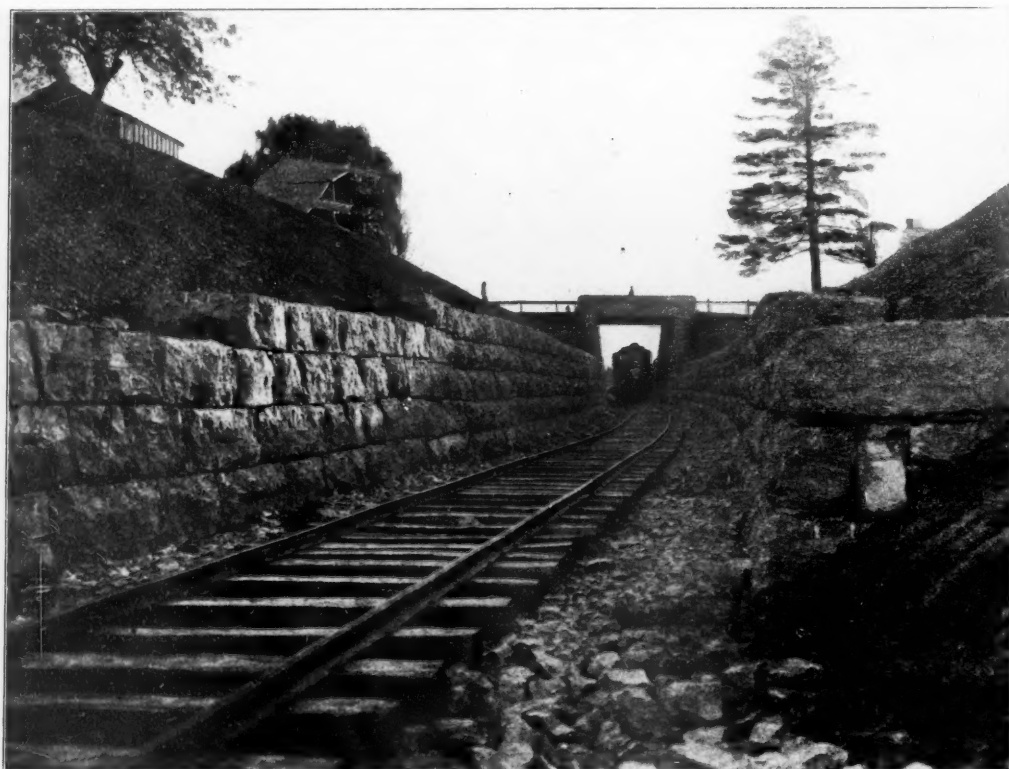
Cross Sections of Culvert.

abutments, about 3 in. below the bottom of the rails. This 3 in. space was filled with mortar (1:3), rather wet. A layer of wet concrete (1:3:5) was then "slushed" in, the layer standing a few inches above top



Rail-Concrete Box Culvert.

of rail. The whole bed was then tamped until the concrete "quaked." On the following day, an upper finishing layer was put on. The concrete was less wet and was tamped lightly, so as not to cause vibration of rails,



Rail-Concrete Bridge at Hurley, N. Y.; New York, Ontario & Western.

time of this repayment may, if desired, extend over six years from the date of assessment; but in several instances, including some of those in which the amount assessed has been the greatest, the counties have preferred to pay the entire sum due at the end of each year. In connection with this joint expense to the county, it is of interest to know that the total number of petitions for new State highways up to the present date is 604, and that 43 petitions were received during 1902, covering 97 miles of road not previously petitioned for.

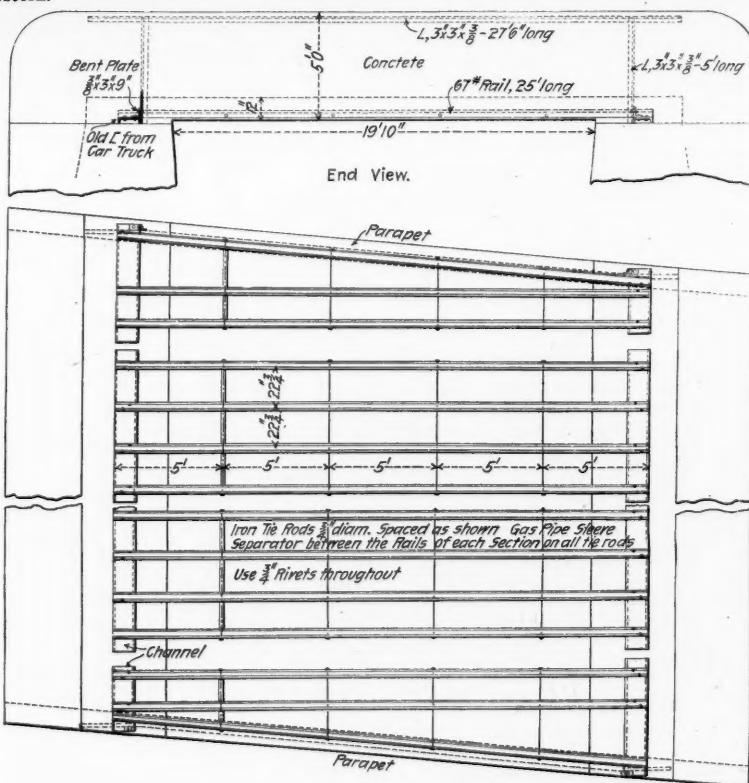
For 1903 the commission recommends an appropriation of \$550,000 with the condition, as heretofore, that \$100,000 shall hold over until next year. The commission is of the opinion that the sum recommended can be spent with greater efficiency and economy than either a larger or a smaller amount, and it also believes that an appropriation of this sum for each year for at least two years in advance would greatly facilitate all engineering and building and also materially reduce the cost. It will be noted that the commission asks for an increase of \$50,000 in the appropriation. Under the present system, which requires the Commonwealth to maintain State roads, it is evident that the amount required for this purpose will increase with the mileage, and that the average cost per mile may be somewhat further increased by resurfacing roads that have worn thin. The average cost per mile per year for maintenance up to the present time has been slightly over \$100.

The continued experiment of using native rock screenings as a binder, even on trap rock roads, is a success. By the use of these screenings a considerable saving in cost is effected on roads built of native rock in the lower course, and trap rock in the upper course. These screenings constitute from 13 to 20 per cent. of the output of the crusher. Clay or earth should never be used as a binder. The standard width of the roadway is 15 ft.,

of old rails. The accompanying illustrations show the method used at the Hurley bridge and also in a box culvert, 6 ft. x 10 ft., now building in the old Delaware & Hudson Canal, at Summitville, N. Y. We are indebted to Mr. C. E. Knickerbocker, Engineer of Maintenance of Way, for the drawings and description.

Ordinary highway bridges are narrow and have no special provision for sidewalks. At Hurley, N. Y., a bridge was required which would give a double roadway and also allow for a sidewalk. The Hurley Cut, which the bridge was to span, had proven of such a treacherous nature that heavy retaining walls had been built the entire length of the cut. It was desired that the bridge should be massive, in keeping with the cut, and a concrete bridge, reinforced with steel rails, was decided upon.

To bring the rails into the same plane, they were riveted in sets of four to old car channels, and the



Arrangement of Rails in Hurley Bridge.



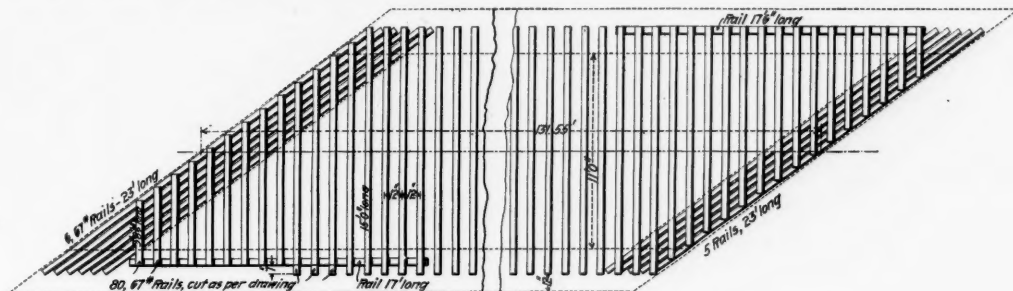
but thoroughly. The top of the roadbed was made convex by use of template, and roughly convex towards the sides. The sidewalk and wheelguard, of concrete, stood 6 in. higher.

The parapet walls were cheaply but effectively re-enforced by two end upright angles and cross angles. The narrowness of the walls, together with bracing angles, would make efficient tamping impossible, so the concrete was put in wet, in 4 in. layers, and worked till in a quaking condition, the result proving very satisfactory. Any slipperiness on the bridge was obviated by allowing

Terminal within one minute of each other and ran with perfect safety over the division.

Mr. Rosenberg, of the Lehigh Valley, stated that freight trains were no longer scheduled on the main line of that road. The line is equipped with automatic signals throughout its whole length, and slow freight trains continue to move ahead of fast freight trains until ordered by the train despatcher to take a side track. A great saving has been effected in the running time of the slow freights since this plan was adopted.

Mr. Mock: On the Michigan Central I do not think



Arrangement of Rails in Concrete Culvert.

the top dressing of finished roadway to extend across the bridge.

In the second tracking now in progress on the New York, Ontario & Western, rail-and-concrete construction has been made standard, for all spans of 16 ft. or less, the thickness of the concrete and the spacing depending on the length of the span. Ten miles of line have already been equipped in this manner, out of a total of 107. There are some places, however, where the clearance, either as a cattle pass or as a water way underneath the bridge, will not permit of sufficient depth of concrete. In this case, it will be necessary to use an open bridge of I-beams.

#### Railway Signaling Club.

The May meeting of the Railway Signaling Club was held at the Great Northern Hotel, Chicago, on Tuesday, the 12th, at 2.30 p.m., President H. C. Hope in the chair. The minutes of the last meeting were approved as printed. Mr. L. R. Clausen was chosen Secretary pro tem. Twenty-two persons, whose applications had been approved by the Executive Committee, were elected members of the club.

Reports of committees being called for, the chairmen of the various committees reported as follows:

Mr. C. A. Christofferson (C. G. W.): The Committee on Standards has not been able to do anything on account of not having money. We need about \$300 to spend on drawings and things of that kind, and we have decided not to do anything until we have the needed money.

Mr. J. C. Mock (M. C.): The Committee on Signal and Track Circuits is working on the subject with a view to making a report at the annual meeting.

Mr. A. G. Shaver (U. P.): The Committee on Distant Signals had a meeting last month and sent out a set of questions to various roads. We have received 24 replies, and hope to have the report in shape for the next meeting.

Mr. C. H. Morrison (Erie): The Committee on Automatic Signaling for Single Track Roads expects to have a meeting in a short time.

President Hope (C., St. P., M. & O.): At our last meeting we left off with Mr. Sperry's question No. 8: "In the preparation of time-tables, what consideration is given to the block signal capacity of the line?" We had not time to discuss it, and it was left for this meeting. I find some of the higher officials have taken quite an interest in that question and I therefore suggested that it be brought up at this meeting. I will ask the Secretary to read some letters which have been received from Mr. A. R. Raymer and others.

From A. R. Raymer (P. & L. E.).

All of our trains between Pittsburgh and Youngstown have been operated by use of electric automatic block signals placed about 4,000 ft. apart for the last six months. Our experience does not bear directly on the question as presented, as the large volume of our freight traffic is handled by trains running as "extra" and therefore not mentioned in the time-tables; but indirectly the block signal system has been of almost inestimable value to our company. Our operating officials are so well pleased with results that they state that the investment has been profitable regardless of the cost.

The advantages that have been noted are—first, a noticeable increase in the speed of our freight trains, which consist of about 60 to 80 cars (3,500 tons per train). The time in running over the division has been cut down by between 33 per cent. and 50 per cent. due to the fact that trains on passing sidings are allowed to follow passenger trains under the block signals instead of waiting to give the usual five to ten minute clearance. Trains running in sections are able to follow one another closely under high speed with safety. Second, rear end collisions have been reduced to a very satisfactory minimum.

Since the installation of these block signals our company had occasion to run a high speed passenger train in two sections; these were despatched from the Pittsburgh

we give any consideration to the block signal capacity of the road in making out the time card. We have to look out for the point where congestion is likely to occur, and that is not in the section where we have block signals. The only block signals we have are the automatic block signals, so that the question does not apply particularly to our conditions.

Mr. Elliott (C., M. & St. P.): I am not aware that on our road the block signal capacity of the line is considered in getting up any time-table, any further than that the trains cannot be run any closer than the distance of the block stations apart. In making up the time-table the running time of the trains has to be so arranged that if, for instance, two trains are to meet at a station, and the block on either side is four miles long, the time must be so arranged that they can meet there.

Mr. Morrison: I do not know exactly what consideration is taken in regard to the block stations on the Erie. Our blocks are all manually operated. All the lap sidings are interlocked and each interlocking tower is a block tower, and if a train is losing time the train despatcher can telegraph or telephone an order for it to go into the siding to let another train pass.

Mr. Mock: Where there is a heavy suburban traffic trains are scheduled one minute apart, and they no doubt consider the block signal capacity.

Mr. Camp (Railway Review): There is much discussion as to whether block signaling increases or decreases the capacity of a line. Many men on single track lines hold that block signals decrease the number of trains that can be handled; others take the opposite view. I think it would be pertinent to consider how block signals might increase the capacity of the line.

Mr. Stevens (A., T. & S. F.): The capacity of our road (the Atchison, Topeka & Santa Fe) has increased with the staff system quite considerably, but it was chiefly on account of doing away with the train orders. Before the inauguration of the staff system the men on trains with four engines (on the mountain) often went out of the office with 25 or 30 orders, which they had to read, and it took them sometimes 40 minutes to get ready to start after the orders were issued; often the train was knocked out by the delay. Mr. Sperry's idea, however, is to take the general run of the trains over the whole road, and not a special proposition of that kind. As to time-tables, we do not have a time-table under the staff system; there is no necessity for it. We have now 30 miles worked by staff. The principal reason for adopting it was delay in starting freight trains out against delayed passenger trains.

Mr. Morrison: I recently had occasion to put a short single track line of 21 miles of block signals in service; and the day that they went into service, a new time-table went into effect, doing away with the train order system. I think the capacity of the division was greatly increased, owing to the fact that we had many more telegraph stations. We could reach trains that were waiting on sidings. I think that the character of the time-table in that case was entirely dependent upon the block system.

Mr. Foster (P., F. W. & C.): Why not take this question the other way around. Have we so designed our signal system that traffic will be facilitated? We have a four-track system (Pennsylvania Lines West), with two tracks in each direction, and it has been our scheme heretofore to start a fast train out right after a slow train and handle it without orders, the train despatcher simply notifying the towerman at a certain tower to pass that train over, and send it from No. 1 to No. 3 track, and in that way run a fast train around perhaps two or three slow trains in the short distance of five miles. We have now got a condition that this plan does not meet, and we are figuring on a scheme to move trains over any one of the four tracks in either direction.

On motion of Mr. Elliott, the discussion on question 8 was closed, and the meeting took up the question presented by Mr. Camp, "Does the block system increase the capacity of the line?"

Mr. Elliott: We must always distinguish between single track blocking and double track. If the

length of blocks is four and five miles on a single track, the trains are necessarily going to be kept that far apart, and it will not be possible to run as many trains as before. Several trainmasters have said that 55 trains a day on single track where the blocks are about four miles long, very closely approaches the capacity of the track. I know of instances where passenger trains were run on five minute intervals and little or no interval between freight trains, that 75 and 80 trains a day were run over a division of 100 miles. On double track if your blocks are long and trains have to be spaced farther apart, necessarily there must be fewer trains run. The question is simply one of what the road is willing to spend on signals to allow the running of a certain number of trains. If with single track blocking you are going to allow trains to enter blocks permissively, very nearly as many trains can be run with the block system as without it. It is the practice on the C., M. & St. P. practically to issue no permissive cards; under those circumstances much fewer trains are run; but we believe it better to maintain a space and not run the chances of trains coming together.

Mr. Foster: On single track the question of the location of the passing siding cuts a greater figure than the location or spacing of the signals. If our engineers will locate their passing sidings properly for the amount of traffic that is to be handled, the signal question will be easy. . . . (Replying to a question.) We are operating pretty satisfactorily with telegraph blocks from eight to ten miles long, but the passing siding proposition is what alters the whole situation.

Mr. Elliott: On our line we do not allow trains to meet at any station where there is no block signal.

Mr. Foster: We have a number of sidings with no signals near, and one of the questions before us is the question of dealing with these. Electric locks on switches and signals have been proposed, to let a train out of a siding remote from a block tower.

Mr. Morrison: We make it a practice to unlock all of our passing and lap sidings at the entering end. We put an electric lock at the outlying switch, with a telephone in a box. There is also an annunciator bell, and the regular bell for the trainmen to use in communicating to the towerman. If orders arrive while the trainman is standing on the siding, the signalman can call the conductor back to the tower to get his orders; if not called back the fact that the switch is unlocked gives the train permission to proceed. We have no signal at the outgoing end of the siding; the electric lock answers for a starting signal.\*

Mr. Foster: We have precisely that same thing, except that we put an electric signal controlled from the tower in on the siding, and instead of unlocking the signal, we give him the signal at once. I would like to have Mr. Morrison state his experience in giving orders by telephone. It is a little bit out of our line, but it has attracted a great deal of attention.

Mr. Morrison: We call the conductor back to the tower and give him his orders to sign. We do not give any train orders through the telephone.

Mr. Christofferson: We have been talking over that matter on our road and we have all been rather afraid of the thing; but a conductor is just as competent to write a train order himself as an operator is. He is a man of age and experience and usually more intelligent than the average operator, and I do not see why he cannot write his own train order and repeat it back to the despatcher.

President Hope: I do not believe in telephoning train orders to a passenger conductor, except in cases of emergency. With the telegraph you have the operator, who acts as clerk and has a check on the whole operation.

Mr. Foster: Our passing sidings are about 5,000 ft. long. We have about 40 miles of line on which we have four interlockings equipped to control remote switches for letting trains out at the far end of a siding, but that is on double track. This has been in satisfactory service now for two years, and this summer we are going to put in 12 or 15 more such installations. We are going to add the telephone; the question of giving telephone train orders in emergencies is still open.

President Hope: The telephone is henceforth to be a part of railroad equipment. We have talked from the train despatcher's office over the telegraph wire for 50 miles; but when it comes to 100 or over, the telephone people are not so successful.

Mr. Morrison (replying to a question): We intend to put an electric lock on every main line switch (that is not interlocked) whether single or double track. We put our block stations as close together as we can and have telephones at all of them. We have bells for block signaling (the same as on the division where the Sykes lock-and-block is used), and these bells are used to call a signalman to the 'phone. On single track, where we have sidings, the eastbound trains have the right of way; they stop at the home signal if the opposing train has not reached the siding; the westbound train takes the siding, then the eastbound train proceeds and the westbound train moves along the siding and gets the permit to go out at the west end. Where we have a lap siding we have four snap jacks by which we can connect the 'phone with the block station on either side or with either outlying switch. The Erie standard 'phone costs \$8.00. We use 10 dry cells at the outlying switches, and 10 or 12

\*This arrangement is described in the *Railroad Gazette*, Feb. 9, 1900; also in "The Block System."

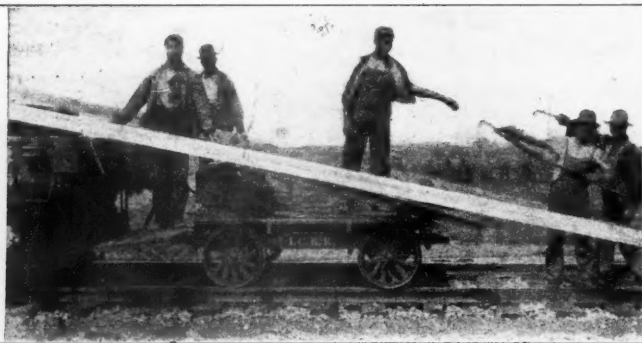


of the gravity in the tower. One station battery operates all the bells in one tower. The bells cost about \$2.25 apiece, and the dry batteries \$1.25; the tower cost \$600, and the telegraph instruments \$10 a set. The electric locks cost about \$150 apiece, including line wires and batteries. The conditions vary in different blocks, but an average block station would cost about \$1,000. The manually operated block system is a great deal more expensive to operate than the automatic, but the operating officials of our road are very well satisfied with the results that we are getting and do not care to go to the automatic at the present time. We very seldom hear of an engineer running by a signal in the stop position.

We have about 100 locks and very few failures. We operate them with the Edison XX cell and always have plenty of strength in the cell. Sometimes the commutator fails, but so far as the lock itself is concerned, we have very few failures.

Mr. Mock: Practically all our double track is under the automatic block system and all our single track is operated by the train dispatcher.

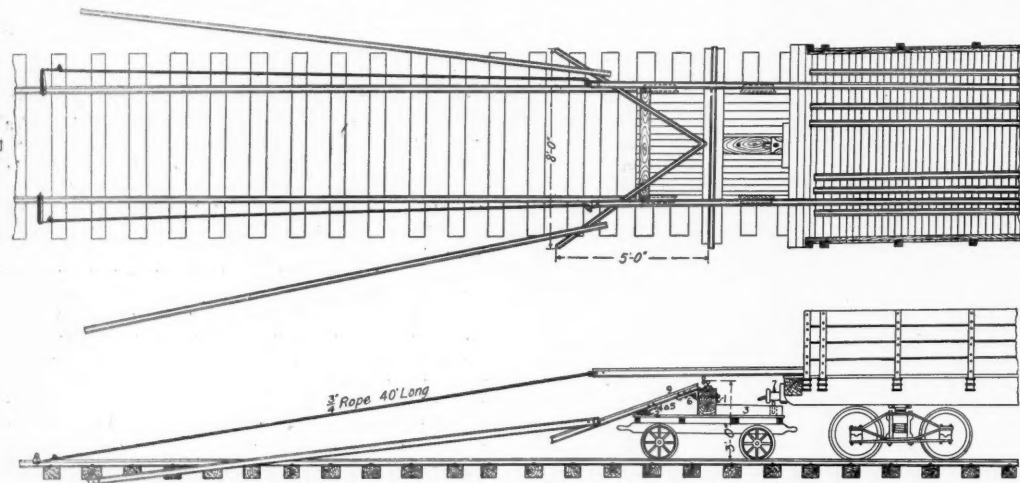
Mr. Foster here described an arrangement existing on his road where a long block section (non-automatic) is equipped with automatic signals to make short blocks in



Unloading Rails, Sheahan Unloader.

one direction only. In a block section five miles long freight trains have to be sent through on permissive signals; but there is at one point in the section a steep descending grade where permissive signaling is objectionable; and here automatic signals have been put in, making short block sections. But these give indication to descending trains only and for protection of these against opposing trains the manual signaling, from one end to the other of the five-mile section has to be maintained the same as though the automatic signals did not exist.

Mr. Elliott: There is a similar situation on the Illinois Central, near Fort Dodge; they have three signals going up the grade and but one signal to go down the grade.



Plan and Elevation, Showing Sheahan Rail Unloader in Operation.

Three trains can be run up the hill at the same time, but only one can use the track going down.

Mr. Foster: There is no question but what our arrangement has increased the capacity of the road, but whether it is good practice or not is a question to discuss. We have had a heavy freight movement the last year and our freight trains have been run down that hill under the automatic signals, permissive, of course, and we have had no accidents; whereas we had accidents before on that same grade. The automatic blocks are about a mile long. The signals are all three-position signals, giving two-block information.

Mr. Clausen (C., M. & St. P.): With a permissive manual signal to cover only that portion of the block which is not covered by the automatic, you might as well put your automatic signal in full regular service for that piece of track.

Mr. Foster: That is what I recommended.

After some further desultory discussion concerning permissive signaling with the automatic system, and concerning the value of the overlap, the meeting adjourned.

On May 15 the Twentieth Century Limited express of the New York Central, eastbound, left Buffalo 52 minutes late, but arrived at Albany only three minutes late and at Tivoli on time.

#### Unloading Rails.

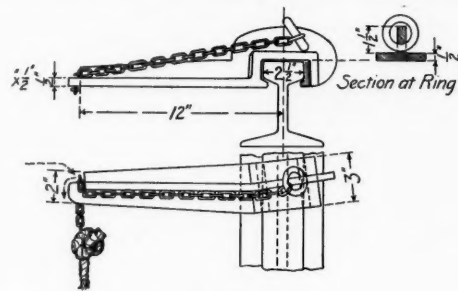
The accompanying diagram shows the essential features of the Sheahan rail unloader, invented by Mr. Dennis Sheahan while he was with the Iowa Central, about 1890, and further improved by him in 1893, when he came to the Illinois Central. The description is a portion of Mr. J. E. Conley's thesis offered for the degree of Bachelor of Science at the University of Illinois.

The device consists of an ordinary rubble or push car upon which is bolted a 10 in. x 18 in. timber 8 ft. long. The timber is perpendicular to the track and is fastened just behind the front axle. Upon the timber is spiked a light T-rail about 8 ft. long. Another piece of light T-rail about 16 ft. long bent in the form of a V is fastened with the apex at the center of the top side of the timber, the free ends of the V projecting outward and downward at the back of the push car. Accompanying the rail unloader are four ropes about 33 ft. long, with a right-angled hook at one end and a clamp at the other. The hook is used in hitching to the rail to be unloaded and the clamp is used in anchoring the outer end of the rope to the rail in the track.

To use the Sheahan unloader, the push car is coupled

vice eighty 85-lb. 30-ft. rails have been unloaded in six minutes.

To unload rails with this machine when the rails are loaded in the usual way for new rails, i.e., in layers, the ball in the lower layer being up, and in the lower layer



Detail of Clamp.

being down, 16 men are required, distributed as follows:

- One foreman in charge,
- Two men in the car to loosen and guide the rails,
- Two men on the unloader to attach the hook,
- Eight men on the ground handling the ropes and clamps,
- Two men on the ground to place the rails right side up and clear of the track,
- One water boy.

If the rails are shipped in open coal cars or on flat cars, the two men in the car can be dispensed with; but if the rails are piled promiscuously on the car, two or three more men may be required.

#### Railroad Telegraph Superintendents.

The twenty-second annual convention of the Association of Railway Telegraph Superintendents met at New Orleans May 13, President J. H. Jacoby, of South Bethlehem, Pa., in the chair. Reports from standing committees were heard. Secretary-Treasurer Drew reported a balance of \$24 in the treasury.

On the invitation of Mr. C. S. Rhoads, of Indianapolis, the Association voted to meet in that city next year, June 15. In the election of officers C. S. Rhoads (C., C. & St. L.), Indianapolis, was chosen President; C. P. Adams (C., R. I. & P.), Chicago, Vice-President; P. W. Drew (W. C.), Milwaukee, Secretary-Treasurer.

C. E. Yetman, of New York, was given the floor of the convention to explain the workings of his new typewriter transmitter. 'It is being used by The Associated Press and by other large concerns. The instrument was on exhibition, and the members were greatly interested in it. Pressing a typewriter key once sends a Morse character, and the machine can be adjusted to any speed. The same machine is quickly convertible into a typewriter for receiving.

Secretary Drew read some proposed amendments to the constitution, which were passed by a unanimous vote. The membership can be greatly extended, and associate members will be admitted.

P. W. Drew read a history of what the several annual conventions have done. There are now 60 active members, representing 53 railroads.

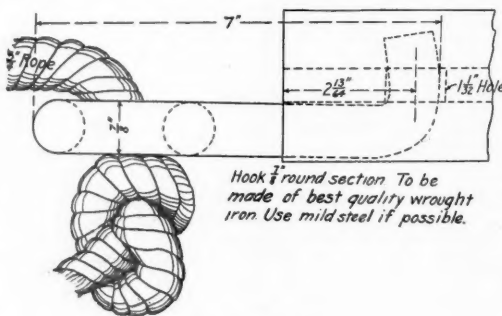
About 20 new members were elected. A letter was read coming from the Remington Typewriter Company on the subject of typewritten train orders, which was accompanied by samples of a typewritten train order. Special large-size letters and figures are used.

On the second day Mr. Jacoby read a paper by Wm. Maver, Jr., of New York, on "Railway Safety Block Signals." This paper was discussed by G. L. Lang, N. D. Vallantine, E. W. Vogel, W. W. Ryder, F. H. Van Etten, C. S. Rhoads, C. A. Darlton, J. H. Jacoby and others. The next paper read was also by Mr. Maver. It was a commentary on Mr. Fry's paper, which was presented to the Association in Chicago last year. Mr. Maver said: "Mr. Fry is to be congratulated for utilizing in the practical manner he has described a way wire, with its 17 main line relays in circuit, for duplex transmission. If he has also succeeded in operating the Edison quadruplex on a similar wire he is to be especially congratulated. I am free to say that I have never succeeded in making the No. 2 side of a quadruplex work in the manner required in commercial practice. Of course, if one should by fortuitous combination of circumstances, or by design, obtain capacity, and inductance in the right proportions on the line, as pointed out by Dr. Pupin, he would get successful results. It would seem, however, in the cases mentioned by Mr. Fry that the inductance would exceed by a considerable extent the amount required to offset the capacity of the circuit; and it might be found in some instances that the balance would be improved by inserting inductance in the artificial line."

Mr. C. F. Annett, of Chicago (Illinois Central), presented a lot of evidence of the usefulness of the telephone on a wrecking train.

Mr. C. A. Darlton, of Washington, Chairman of the Committee on Typewritten Train Orders, stated that the American Railway Association had agreed to look into the proposition made by this Association to amend the rules to permit the use of the typewriter by operators in receiving telegraphic train orders. When the matter was first brought to the attention of the American Railway Association strenuous objections were raised to the proposed amendment, but after the matter had been thoroughly discussed by the committee, and by Secretary

it falls outside of the rail in the track. When the first rail is about one-quarter to one-third of the way off, the hooks of the other two ropes are fastened to another pair of rails, and the rear ends of the ropes are at-



Detail of Hook.

tached at the next succeeding rail joints, and the result is that about the time the first rail drops, a second begins to drag off the car, and thus two strings of rails, one on each side, are continually leaving the car. With this de-



Allen, of the American Railway Association, he was confident that the rule would be changed before long.

Mr. W. W. Ryder read a paper explaining his new switchboard which he had found so simple that the average railroad operator could understand and handle it without previous instruction.

After adjournment at 1 p.m., the members spent two hours riding around the Illinois Central Belt, taking in the Stuyvesant Docks and the river front, the freight sheds and the terminals of the road.

On the third day (May 15) Mr. G. L. Lang read a description of C. K. Jones's automatic telegraph circuit and signaling machine. This was followed by the reading of a paper by Mr. F. A. C. Ferguson on the composite telegraph and telephone circuit. This subject was discussed with great spirit, for it was one in which all were interested. A committee was appointed to investigate the workings of circuits now in operation in order to pass on the efficiency of the use of a single wire for telephone and telegraph communication at one time. A representative of the Bell Telephone Company recited an instance where he received a telephone message with almost perfect pre-

#### A Multiple Steam Pipe.

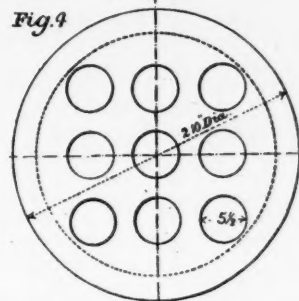
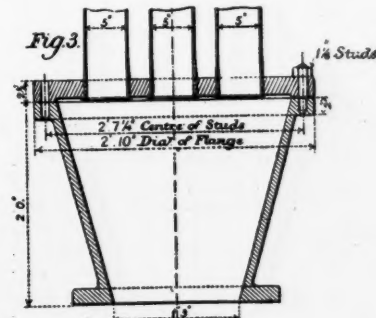
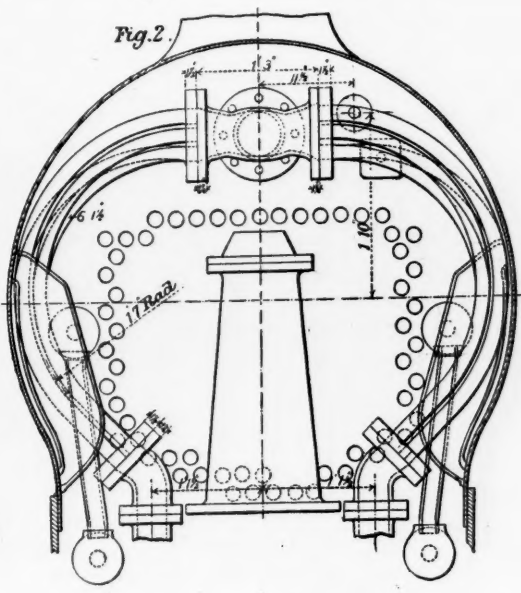
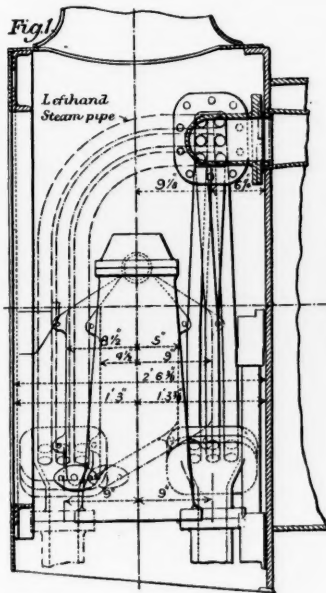
The accompanying engravings show a new multiple steam pipe which has been in use on some of the locomotives of the London & South Western for several months, and, according to *Engineering*, has met with considerable success.

In place of the ordinary single steam pipe in the smoke-box to conduct the steam from the boiler to the cylinders, a number of smaller pipes are used. To the ordinary internal steam pipe there is fitted a flanged steel T-piece, which is just inside the smoke-box, as shown, and into this are expanded, in holes provided for the purpose, as in a tube-plate, the smaller tubes. At their lower end, these tubes are again expanded into another receptacle (Fig. 3), which collects the steam, and through which it passes to the engine cylinders. Fig. 4 shows an arrangement with nine tubes. The steel tubes used are cheaper than a copper steam pipe, and, being of small diameter, are easily bent to the required radius. The area exposed to the hot gases enables the steam to be thoroughly dried, or, in some cases, to be superheated. It is intended, also,

tors to be mounted on the right side. The prairie type of boiler permits mounting on the boiler head, both on the right side or one on either side of the boiler. With these facts before you it is not necessary to say how many of the smaller pipes and valves are to be contended with, but would suggest that the injector should be mounted in such a way that it would be rigid in a place where the engineer or fireman could work it to the best advantage, and in cases where they must put it outside of the cab, reduce the length of the reach rod as much as possible. With the lever injectors, permit the lever to remain on the injector and couple the rod on the lever with a suitable hand-hold projecting into the cab.

The injector manufacturers have specified certain sizes of pipe to be used in mounting them; these sizes must be used in every case as careful tests have been made to prove their necessity.

Only good mechanics should be permitted to repair injectors. There should be kept a good stock of repair parts; also a jar of diluted muriatic acid (a leaden jar for this is best) in which parts should be immersed for 15 minutes. If an injector is not giving good service it



Multiple Steam Pipe for Locomotives.

cision between Pittsburg and New York, while the wire was being operated for telegraphic purposes. Where the circuit is underground the transmission of the telephone messages is, however, interfered with by the Morse messages going over the wire at the same time.

One thing appeared evident from the discussion, and that is that the composite system is wanted by many railroad managers. The committee referred to consists of E. P. Griffith, of New York; J. H. Jacoby, of South Bethlehem, Pa.; W. W. Ryder, of Chicago, Ill., and U. J. Fry, of Milwaukee, Wis.

Mr. F. F. Fowle read a paper in which he demonstrated his proposition for transposition of telephone circuits. Mr. W. W. Ryder read a paper on the Telegraph Camp Train.

On Saturday, the 16th, the Louisville & Nashville gave the delegates an excursion to several points on the Mexican Gulf.

The local Committee on Entertainment was very active and efficient. The chairman was Mr. Percy Hewitt, assistant superintendent of telegraph, of the Southern Pacific Company.

#### EXHIBITS AND EXHIBITORS.

W. S. Logue, Edison Manufacturing Co., New York—Edison products used in the railroad telegraph service.

Avery P. Eckert, The Safety Insulated Wire and Cable Co., New York—Samples of wires and cables.

E. W. Vogel, Chicago—A display of signals; a block signal in a neat iron case; relays in bells of the Chicago Crossing signal, block-signal relays, and battery coppers, round battery zincs, bond wires.

The Yetman Telegraph Transmitter, Charles E. Yetman and G. W. Conklin, New York—Several typewriter transmitters. These were examined and tested by everybody. On the afternoon of May 14 a long-distance trial of the transmitter was given. Western Union wires to Atlanta and return, 1,000 miles, were run into the convention room. The quality of the "Morse" was declared to be as perfect as machinery could make it, while the speed was graduated from 60 to 15 words a minute.

C. K. Jones, Tusculum, Ala.—Automatic Telegraph Circuit Protector and Signaling Machine; a device to eliminate delays due to failure to raise operators quickly. It is an electrical instrument attached to the back part of a clock, and actuated by the clock mechanism.

The American Telephone & Telegraph Company was represented by Percival W. Miller, F. F. Fowle and J. E. Gordon, of New York; A. G. Francis, Chicago, and Col. William H. Adkins, Atlanta. Mr. Miller had a composite circuit in operation in his parlor, used simultaneously for the telegraph and the telephone.

M. E. Launbranch represented the Western Electric Company, of Chicago, and C. E. Brown the Central Electric Co., of Chicago.

for marine purposes, to reduce the risks attending the use of large steam pipes. The device is the invention of Messrs. W. and G. Drummond, 13 Victoria street, London.

#### Injectors.\*

The general decision is that a lifting injector should be mounted with the lower connection or suction pipe connection on a line with the top of the engine tank and also in a convenient and accessible place in the engine cab; a suggestion that the injector be mounted outside the cab and the suction pipe run through the cab has received some favor. With the large tanks that many of the locomotives are supplied with to-day it would mean that the injector would have a lift of from 4 to 5 ft. when the water in the tank became two-thirds exhausted, and in the Wootten type boiler it means more than that because there are about 25 ft. of pipe between the injector and water supply, meaning there would be this 25 ft. horizontal draw, and say 4 or 5 ft. vertical lift, which with all the necessary bends to accommodate the pipe to this class of engine boiler we have conditions of friction which must be overcome by increasing the pipe to such a size that the friction will not reduce the maximum supply required for the boiler.

In the case of wagon top boilers and Belpaire boilers with full or half deck, etc., the general practice is to mount one injector on the right side and one on the left side, just inside of the cab, with the branch pipe connection outside of the cab. We find also on this class of boiler the injectors mounted in battery on the right side, each injector running into a separate branch pipe and a separate boiler check. Another method is to mount the injectors in battery and run both injectors into a single branch pipe and a single boiler check. This is done by attaching a Y casting to the branch pipes and a short piece of pipe to each injector and putting an intermediate check in between the Y and injector. Many cases have been noted, however, where the intermediate check has been left out. When the intermediate check has been left out special care should be given to maintaining the injector line check. When the injectors have been mounted in battery there does not appear to be any general rule that governed the location of the injector; some are placed inside, others are placed outside of the cab, the idea of convenience of location in many cases being forgotten.

The Wootten type of boiler requires both of the injec-

should be examined and tested under steam while on the engine. Enginemen should be required to report intelligently the action of injectors when repairs are needed.

Some examples of improper action of injectors such as failure to force water into the boiler, failure to prime, etc., were given, with the causes and remedies for the same. With regard to failure to prime the author says:

If the injector has been recently cleaned we would be safe in saying the difficulty lay between the injector overflow and engine tank; there may be a bad leak at the suction pipe connection to the injector, the strainer may be stopped up or the tank valve may be shut, having come loose from the rod. The first thing to do is to put the injector on as a heater; this would show up all leaks; if any are found repair them. If this does not overcome the difficulty disconnect the hose at the suction pipe end, put the injector to prime and note if steam blows back. If steam does blow back it indicates there is some derangement or stoppage of the tubes. By taking out the steam valve hub, the steam valve and primer in some constructions come out with it and can be examined freely. The priming of the engine may have caused scale to be lodged in the primer passages. By inserting a small rod it can soon be determined whether there is any foreign substance in the lifting tube. With the help of a lighted candle you can examine and note the condition of the steam nozzle. This could be done quickly and without removing the injector from the engine, thereby avoiding many delays of the engine. Before connecting the hose the tank valve should be opened to be sure there is a good flow of water coming to the suction pipe.

Where it is possible to examine an injector without disconnecting all of the pipe couplings there is a point gained. Another point is that simplicity of construction means a big saving in time whether the injector is taken down or left on the engine when examination and repairs are made.

The hose and couplings have been lost sight of in the growth in size of motive power, and on many of the heaviest engines a hose coupling with a 1½-in. or 1¾-in. opening is coupled onto a 2½-in. suction pipe; attached to these same couplings is a 2½-in. hose with a coil of wire inside to keep it from buckling; and last, the conical strainer. Let us break away from this conical strainer. There are many good strainers, any one of which can be applied to the suction pipe to good effect.

The same practice has been followed with reference to the tank goose-neck as with the hose and couplings. The 1½-in. and 1¾-in. goose-necks are being applied to furnish the water supply to the 2-in. and 2½-

\*Abstract of a paper presented to the May meeting of the Western Railway Club by Mr. F. W. Edwards, Mechanical Engineer, Ohio Injector Co.

in. inside diameter suction pipes. Get rid of these small goose-necks as soon as possible, and apply a good tank well with the enlarged goose-neck. Put over this tank well a good tank valve that will always maintain a full area opening equal to the suction-pipe area. This tank valve should be tight when shut off.

A hand-hole in the bottom of the tank well has been found of great convenience for cleaning purposes. Many of the roads have been using a wire strainer fitted into the tank man-hole to keep the coal, waste and extra over-suits out of the tank. The use of this screen is good practice and should be universally adopted.

#### Premiums For Motormen and Conductors.

An innovation in the matter of premiums has recently been reported by the Union Internationale de Tramways et de Chemins de Fer d'Intérêt Local. Several of the Continental street railroad companies give premiums for economy in the use of power. The Magdeburg Tramway Company has adopted this plan, and in 1901, without the knowledge of the motormen, wattmeters were placed on several cars to see whether different motormen used greatly different amounts of current in covering the same route. Since then 42 out of a total of 130 cars have been thus equipped, and the meters were changed from one car to another so as to test each motorman for about one-third of his time. The readings on the wattmeter were taken by the station superintendent every morning, and each time the cars were changed.

The basis of comparison was the tonne-kilometer. Inasmuch as the power required varies, not only with the type of car but also with the route over which it is run, it was found necessary to adopt certain constants in order that a just and proper basis of comparison could be used. It was found that on a certain route the average consumption per car was 70.24 watt-hours per ton-mile for a single truck car weighing 18,000 lbs., about 66.49 watt-hours per ton-mile for a single truck car weighing 20,600 lbs., and 54.86 watt-hours per ton-mile for a double truck car weighing 23,800 lbs. The car weighing 20,600 lbs. was taken as the standard, subtracting 5.35 per cent. from the readings obtained with the light car, and adding 21.18 per cent. to the readings obtained with the double truck car—in order that all results could be reduced to a given basis. The men are then classified according to their records during each quarter, and the 25 motormen who make the poorest showing, and who average about 15 per cent. of the total number, are warned. If a man receives three warnings, he is either discharged or his wages cut.

Prizes are given to the 35 motormen (about 21 per cent. of the total number employed) who have the best records. That this plan has been successful is shown by the fact that for the first quarter in 1901, the watt-hours per tonne-kilometer for unloaded cars was 67.086, 59.495 and 56.125 for the first, second and third quarters respectively.

The actual cost of introducing the system, including interest and depreciation on the investment, together with the increase in clerical force, was \$287.50. About 10 per

every three months from the records of the previous quarter. The motormen receive half the amount, and the conductors divide the other half proportionately to their receipts.

The prizes for economy of current are distributed each year and are as follows:

Prize.	Watt-hours per car-mile.
\$60	744
120	728
200	708
320	692
500	676

The cars weigh empty seven tons each. The average consumption for each quarter is obtained by taking the total consumption of the cars and dividing this by the total car miles. Half the prize for economy of current is divided equally among all the conductors, and the other half is divided among the motormen according to a coefficient based on their relative efficiency. The company has six cars equipped with Thomson wattmeters and the motormen take turns in running them, one day with each car. At the end of the quarter each motorman has operated a registering car a number of times and the average is taken as his efficiency coefficient. By the plan followed, it is noticed that each man is interested in saving current, whether operating a test car or not, as the bonus for the entire force depends on the total consumption.

#### Some New English and Continental Passenger Cars.

The car shown in plan and elevation in Fig. 1 is one of a number which are being operated by the Sleeping

car is less roomy than those usually found in this country. It is 64 ft. 9 in. over buffers, 9 ft. 3 in. wide at eaves, and 13 ft. 1 in. high. It is mounted on two four-wheel trucks and weighs about 83,000 lbs. The interior finish of the cars is in a light gray cloth worked in silk designs, with inlaid woodwork. The general effect is pleasing and the decorations are very harmonious. The berths are transverse, placed one above the other. Between all compartments there is a lavatory, supplied with hot and cold water, and toilet conveniences are provided at each end of the car; one for men, and one for women.

The Sleeping Car company operates these cars under contract with the railroad company by which the former guarantees a certain number of passengers, and this occasions a high supplemental charge. The railroad company also receives a variable proportion of this supplemental fare, in some cases as much as one-half.

Fig. 2 shows in plan and elevation one of a number of sleeping cars built by the London & North Western and in service on the West Coast route between London and Edinburgh. The car body is 65 ft. 6 in. over all, 9 ft. wide and 12 ft. 7½ in. high, having a clear height inside from the floor of 8 ft. 2 in. The weight is 87,560 lbs. and the car accommodates 11 passengers. It is divided into seven single compartments and two double compartments. In every one a wash basin is provided and further toilet facilities are placed at one end of the car. At the other end of the car is a smoking room and a small compartment for the attendant, who is provided with facilities for preparing light meals. The cars are equipped with wide vestibules and are piped for automatic vacuum and Westinghouse brakes, as well as steam heat from the engine. The longest trip with this car is only about 14

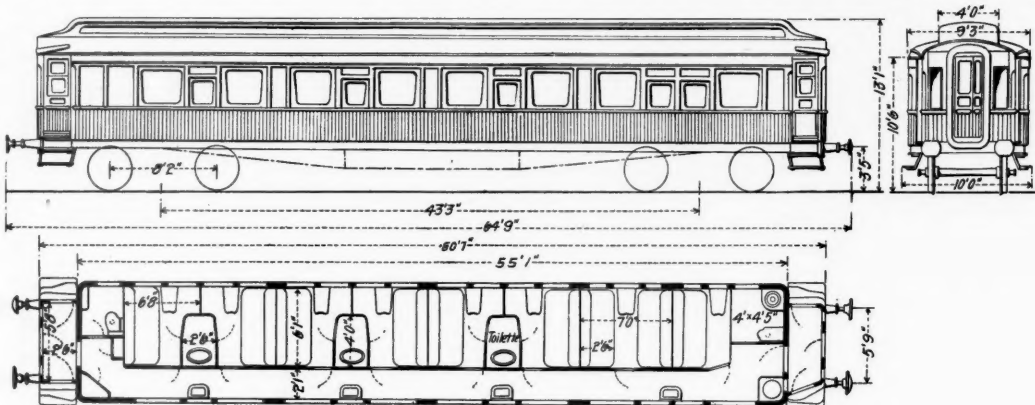


Fig. 1.—Continental Sleeping Car.

Car Company over the lines of the Paris, Lyons & Mediterranean, and in the Orient express from Paris to Constantinople. As will be seen from the floor plan, these cars are built on the compartment system, which has always been a favorite in Europe. Owing to the limited clearances allowed, the

hours, and the charge for any distance is only about 5s. more than the ordinary first-class fare. This is no doubt owing to the fact that the cars are operated by the company and not by an outside corporation.

The floor plan shown in Fig. 3 is that of a dining car used in the same service as the sleeping car previously

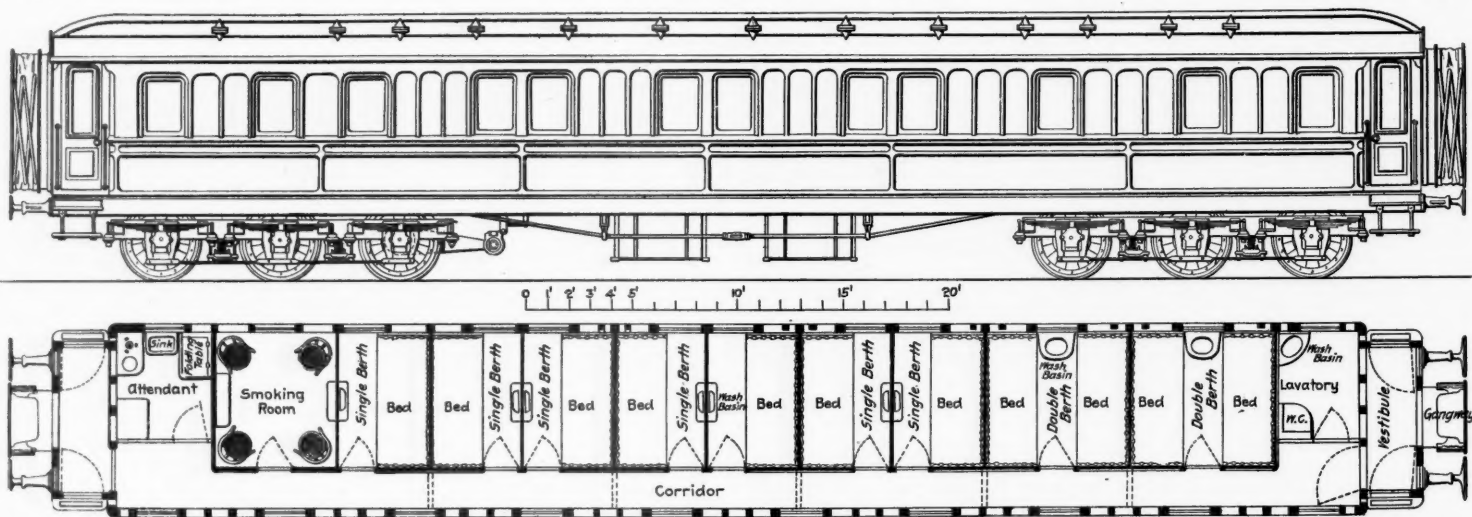


Fig. 2.—Sleeping Car—London & North Western.

cent. of the money saving effected by the system was last year distributed among the 35 employees mentioned above, the highest amount received by any one man being \$19.50. Estimating the cost of power at 2¼ cents per kilowatt-hour, and deducting the fixed charges noted above, shows that during the second quarter of 1902 about \$1,782 was saved, and during the third quarter the saving amounted to \$2,238.

The Rheims Tramways Company has also tried this system but the award of prizes is based on the number of passengers carried. The prizes are equally divided between the motormen and conductors. This is evidently good practice inasmuch as the conductor can assist the motorman in saving current by not compelling him to make unnecessary stops. The number of passengers was included in the conditions in order that the motormen would not be tempted to run by passengers, in order to save the current consumed in starting the car from rest.

The prizes based on receipts are one-tenth of the amount received above 12.8 cents per car-mile, and are awarded

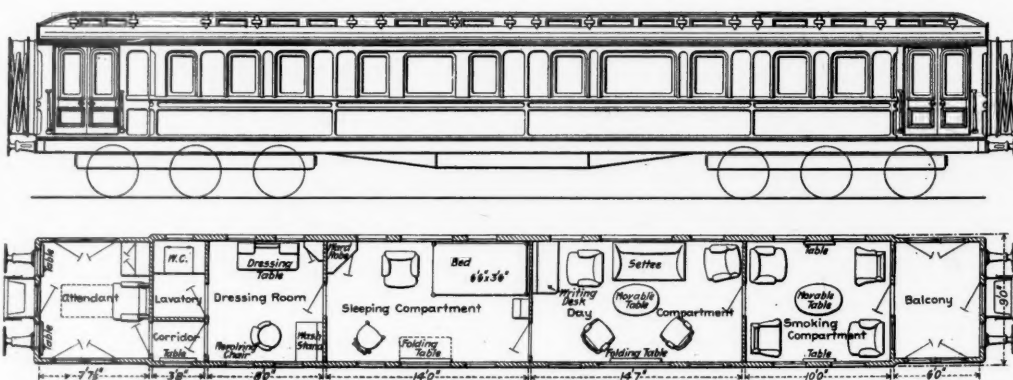


Fig. 4.—King's Saloon—London & North Western.



described. It is similar in its dimensions, but is 8 ft. 6 in. wide, instead of 9 ft. The weight is 91,840 lbs. and the car has a seating capacity of 20. It is mounted on two six-wheel trucks, the same as are shown in the elevation in Fig. 2. The arrangement of the kitchen and pantries at one end of the car is somewhat different from that usually found in similar cars in this country, there being rather less room. The kitchen has tiled walls, and the floor is of the same material. The finish of the dining room is in rich, dark wood. Piping is provided for vacuum and Westinghouse brakes, and steam heating, and the Stone system of axle light is used. These cars are usually run in pairs, one being for the use of the first-class and the other for the use of the third-class passengers.

In Figs. 4 and 5 are shown plans and elevation of two

Venetians during their occupation of the Peloponnesus, to Governor Capodistria in the early days of Greek independence, to the Cretan engineer Lygouni, and especially to the Greek Government itself, which, in 1869, passed a law authorizing the construction of the canal. But it was not until 1881 that General Türr, aide-de-camp of King Victor Emanuel, obtained the necessary rights for beginning the work and organized a canal company with its seat in Paris.

The work began from the Corinthian side and was divided into five sections. Little difficulty was experienced in the first three, or about 5,140 yds. of the whole. With the same despatch, also, the last section jutting upon the isthmian side was made ready. It was in cutting through the 326 yds. which stretched between these por-

serted by foreign craft, and the numerous vessels which come from the north and touch at Patras persist in braving the Greek coast line, the storms off the southern capes, and the twenty-odd hours' extra sailing to a use of the Corinthian Canal.

The reason is that the canal is poorly located. The winds which render the open gulf a raging sea do not subside at the approach to the waterway. The canal is like a huge air shaft, and the mighty currents of air which rush from one gulf to the other are not calculated to encourage the mariner to run his ship between precipitous walls 260 ft. high and separated by only 80 ft. of sea.

A second obstacle takes the form of a reversing current, due to a striking variation in the tides of the two gulfs. The real difficulty, however, is the size of the canal

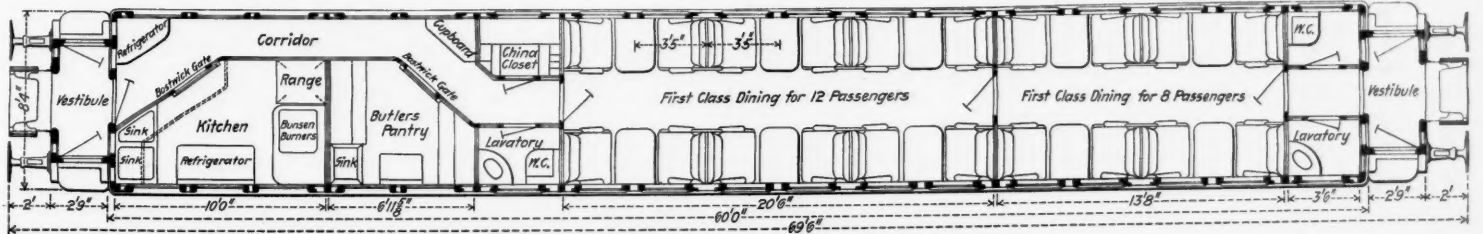


Fig. 3.—Dining Car—London & North Western.

new Royal saloons built by the London & North Western for their Majesties, the King and Queen. The cars are similar in external dimensions and appearance and are of the following size: Length over buffers, 69-ft. 6 in.; width at eaves, 8 ft. 11 in.; height, 12 ft. 7½ in.; inside height from floor, 8 ft. 2 in.; weight, 89,600 lbs. This is the maximum possible with the loading gage for this line. The King's saloon is divided into four compartments; a smoking room, a day compartment, sleeping and dressing rooms, with an additional compartment for the

tions—a section formed of material so hard that the use of dynamite failed to dislodge a single block—that the company met its greatest drawback, and notwithstanding the extension of time accorded for the completion of the contract, the society found itself out of funds and unable to continue the work. A new subscription was made, and the society dispensed with its costly machines—which were useless in cutting through the flintlike strata—and purchased others which in the end proved as unavailable as the former ones. These and other expenses (notable

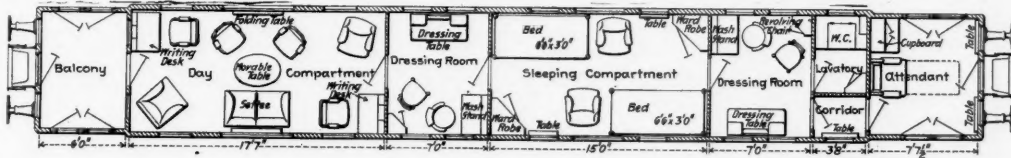


Fig. 5.—Queen's Saloon—London & North Western.

attendants. A large vestibule or observation compartment occupies the other end of the car, and when both cars are used in the same train the two vestibules or balconies are coupled end to end. The finish of the King's saloon is of mahogany and other rare woods. Special provision has been made for heating and ventilating by means of electric heaters and fans. The Queen's saloon is finished in white enamel and is provided with two dressing rooms. It is similarly fitted with electric heaters and fans. The attendants' compartment in each saloon is supplied with electric appliances for cooking. These cars are built and owned by the railroad company but are for the exclusive use of the King and Queen, who are nominally supposed to pay a rental fee for their use whenever required. This, however, is quite small in comparison with the expense of building and maintaining the cars.

#### The Corinthian Canal.\*

BY FRANK W. JACKSON, Consul.

A report upon the canal which connects the Gulf of Corinth with the Gulf of Ægina, cutting its way through the Isthmus of Corinth, or Megara, may not be considered of particular value to our own country in its proposed shortening of the sea distance between New York and San Francisco, as the canal of Corinth dwindles into insignificance when compared with either the Panama or Nicaragua water routes; yet the Corinthian Canal may be considered a miniature of our projected transcontinental water route, and it is with this in view that I propose to give a few of its more important features. For statistics and other data, I am indebted to Mr. A. Raugabé, general secretary of the canal company in Athens, who has very courteously rendered much valuable assistance in the compilation of facts concerning the history and construction of the canal.

A few details as to the historical side of this undertaking may be of interest. I may note that in so far as the unsuccessful modern attempts are concerned, there are striking similarities between the canal of Corinth and the original Panama Canal, since both feats were undertaken and eventually abandoned by companies supported by French capital.

It was as early as 600 B. C. that Periander, tyrant of Corinth, proposed to cut his way through the little neck of land which was all that separated this city from the other centers of Greek trade; but he was confronted by too much superstition to make his scheme feasible. Both Julius Caesar and Caligula revived the canal scheme, but neither of these Romans succeeded in effecting anything. To the Emperor Nero falls the credit of the first decisive attempt to cut through the isthmus and, from evidence still to be seen, the work was prosecuted with vigor, but was interrupted by his death. The resurrection of the scheme may be credited to many in later times—to the

among which must be recorded that of bridging the canal, at a cost of \$80,000) rapidly reduced the newly subscribed capital, and in 1890 the society found itself again penniless and a receiver was appointed.

The failure of this company represented an outlay of almost \$10,000,000. It was then that Mr. Syngros organized the present enterprise with a capital of 5,000,000 francs (\$965,000), which rapidly, but not without hardships, completed the work. Assisted by the National Bank of Greece and the Cretan Industrial Bank, Mr. Syngros at once secured the necessary funds, and, in spite of the solid rock yet to be cut through, the canal was completed three years after the failure of the old

itself; its width at the bottom is 68 ft. 11 in., and it has a depth of 26 ft. 3 in. The largest vessel to have used the canal, so far as I can learn, was the Italian cruiser "Giovanni Bausan," of the following dimensions: Length, 275 ft.; beam, 42.6 ft.; draft, 18.4 ft.; and tonnage, 3,068. However, vessels of 23.5 ft. draft and 68.5 ft. beam are permitted by the regulations to pass, which dimensions would include most of the steamers regularly trading in Greek waters. Nevertheless, the exacting pilotage which such dimensions render necessary, emphasized by the reversing current, has so far served to make the canal a much less appreciated water route than it would have been in the days when steamships were more modest in their dimensions.

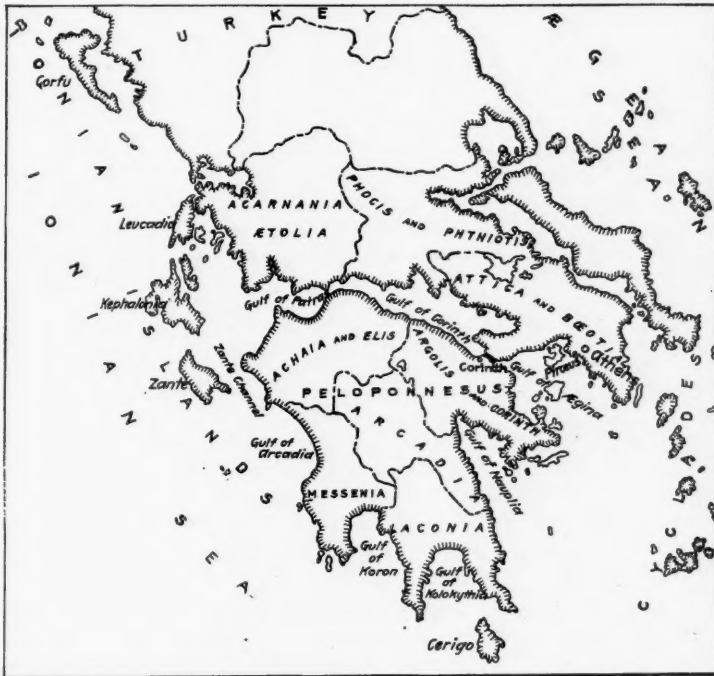
It is too late to think of changing the size of the route, but the other difficulties can be reduced, and it is probable that some effort will be made to remedy matters. At each approach the small breakwaters, while rendering necessary service, contribute to the difficulties of navigation, and are not sufficient protection. It is proposed to supersede these barriers by two large harbors that will make the approach less hazardous and will largely regulate the current. No action, I believe, has been taken, but some such plan is under consideration, although the extraordinary depth of the Corinthian Gulf will render the repairs very costly.

The harbor on the Corinthian side is formed by two arms running from each side of the isthmus and terminating in a line with the two sides of the channel, so that vessels entering are ready to steer ahead. The isthmian harbor is formed of but a single arm, which closes the channel entirely toward the mainland and requires the setting of a new course, both on entering and leaving the canal.

The span of the isthmus, as traced by the canal from gulf to gulf, is 3.94 miles, and its greatest depth 259.7 ft. A solid block of masonry, some 6 ft. in thickness, lines the base and sides of the channel to a height of 32.5 ft., or about 7 ft. above the sea level, as a protection against the currents, its extremities making a substantial quay on each side from sea to sea. The sides of the channel have required no special protection of masonry, except in a few sections, notwithstanding their precipitous pitch. A passenger on one of the Greek steamers, looking up at the railroad bridge which crosses the canal at a height of 122 ft. and is but 262 ft. long from end to end, believes himself to be gazing almost straight upward, while the slopes of the deepest part of the channel, by reason of their greater height, rise like two perpendicular cliffs.

The slopes are protected from erosion by conduits which skirt the edge of the summits and carry away all surface water. Sixty electric lamps of 20 candle-power mark the channel at night, and on each side at distances of 600 ft. are attached iron stanchions, to which ships may tie in case of

accident or as a protection against a driving current. If one of the present line of foreign steamers should decide that the twenty hours gained by using the canal are worth the saving at any price, or if a Greek line of steamers are fitted out to compete for a share in the far-sea trade, competition will drive the other lines in their wake, and the canal company will come into its share of the receipts which are literally going up in the smoke of every steamship which rounds Cape Matapan.



Map of Greece, Showing Canal Connecting the Gulfs of Corinth and Ægina.

company and the formal inauguration celebrated in July, 1893. The canal shortens the distance between all points in the Adriatic and the Piræus more than 130 miles. It is not an expensive water route, and it brings Patras and Piræus, the two centers of the export and import trade—at both of which most vessels must touch—within 12 hours of each other. Yet with all these advantages, in an age when a day's time not infrequently decides the fate of competition, the picturesque water route is almost de-

\*From U. S. Government Consular Reports.





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#### EDITORIAL ANNOUNCEMENTS.

**CONTRIBUTIONS.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**ADVERTISEMENTS.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The various State commissions in Massachusetts have an enviable record for doing what they set out to do, not only during political campaigns, but at other times as well. The Highway Commission, whose report is printed in part elsewhere in this issue, has been in existence since 1894, and in 10 years has completed over 400 miles of good roads, which have been built in substantial manner and also maintained. At the time when the Illinois Central was running a good roads train over its southern lines, in the spring of 1901, editorial comment was made in these columns on the influence of good highways upon railroad prosperity. It was pointed out that the productive capacity of a community increases proportionately with the ease of hauling products and with the energy of the inhabitants, and that good, solid roads tended to make a community wide awake and active, while mud sloughs were an industrial setback. Nineteen hundred and one was a notable "good roads" year. In addition to the corps of roadmakers which for three months toured Mississippi, Louisiana, Kentucky and Tennessee on the Illinois Central, building short stretches of good road in the manner most economical for each locality, the Southern sent out a train, on a similar mission, which made a trip of nearly 6,000 miles, through Virginia, the Carolinas, Tennessee and Alabama. Agitations were started in Tennessee, Mississippi and Louisiana to carry on the movement for good roads, and additional interest was aroused in Kentucky, which has for some years possessed a better system of highways than its neighbors. But the permanent results accomplished seem nowhere to have been very great, presumably because agitations are easier to secure than appropriations. Massachusetts is unique among the States in its seeming willingness to back up its convictions with funds.

The power of the farmers in the Connecticut legislature and their attitude toward railroad legislation recall the disastrous granger laws enacted in Illinois, Wisconsin and other western States more than a quarter century ago. In the lower house of the Connecticut General Assembly, out of a total of 255 members, there are 90 farmers. These early in the session formed a "Farmers' Association," which at the beginning of each weekly sitting has "caucussed" on coming legislation with special attention to railroad measures. It caucussed against the bill repealing the general railroad law of the State on the ground that farm interests would be promoted by long distance electric roads built under the existing statute—and consequently the "repealer" was dropped last week although fathered by the powerful New York, New Haven & Hartford railroad company and supported by most of the operating electric companies in the State. It has caucussed also against change in the four days' car detention law and is making hard sledding for the New Haven

company in its effort to reduce the four days to two. Finally the association has, by direct or indirect influence, secured a favorable committee report on a remarkable measure by which all towns in the State with less than \$2,000,000 of taxable property, and which incurred debts in aid of railroad building many years ago, can receive from the State one per cent. a year toward the payment of the debt, provided the town itself pays a similar amount. The bill is a substitute for an earlier one providing that the State should "swap" its low rate bonds for the higher interest rate bonds of the town, and in essence is considerably worse. As a token that the socialistic dictum is not a product of the cities, but may root itself even in staid New England farm communities, the legislative incident is suggestive.

#### Limiting Working Hours of Trainmen.

The Legislature of Indiana has passed a law intended to forbid trainmen working more than 16 hours without rest; and, according to the newspapers, one railroad company has issued a bulletin, quoting the law, and giving notice that officers doing anything contrary to the statute will be disciplined. The principal section of the law reads:

That it shall be unlawful for any superintendent, train dispatcher, yardmaster, foreman or other railroad official to permit, exact, demand or require any engineer, fireman, conductor, brakeman, switchman or other employee, engaged in the movement of passenger or freight trains, or in switching service in yards or railroad stations, to remain on duty more than sixteen (16) consecutive hours, unless in case of accident, wreck or other unavoidable cause, without at least eight hours' rest and relief from all duty whatever.

In order to get any reasonable understanding of the uses of this law there seems to be needed the evidence produced before the legislative committee and the discussions of the legislators. The language is ambiguous, if not contradictory. The originator of the bill appears to have a good heart, and when he says that the superintendent (the actual head officer) shall neither permit nor require overwork he shows a good head; or at least one good enough to see that both the officer and the employee are often to blame when trainmen work beyond the proper limit of physical endurance. But beyond this, both motive and object are obscure.

In investigating the causes of train accidents it has been developed not infrequently, both in England and the United States, that the trainman at fault has been on duty for so long a period that he could not be reasonably expected to be vigilant and at his best. It may be that a gateman at a country crossing may be capable of such long attendance to duty, because the physical and mental requirements are slight. It does not seem possible that any such length of service as 16 consecutive hours, or anything approaching that number, is required from the engineer, fireman, conductor or brakeman in regular service for consecutive days, except in cases of unusual emergency, either in Indiana or elsewhere. At the same time, the enormous freight movement of the past year, with the constant introduction of larger and larger engines, has, no doubt, lengthened the time of runs in cases to somewhere near 16 hours; and with the pressure to break blockades "emergencies" have been so classified which ought to have been prevented. If a train which is scheduled at 12 hours comes in 3 hours late four days in a week the overtime can hardly be charged to an emergency; it is due to an impracticable schedule. Again, the arrangement of runs so that trainmen are always away from home at one end tends to foster irregular hours, and that means long hours. Assuming that an engineman is to have 24 hours off, out of every 48 hours, he usually has a strong incentive to try to take 17 hours at the home end and only 7 at the other. But in thus introducing an irregular schedule it is frequently impracticable to maintain the restrictive limits that are contemplated at the outset, and so it soon turns out that the 7 hours is reduced to 5, 4 or less. That the rest-period at the other end is correspondingly lengthened does not cure the difficulty. Furthermore, as everybody knows, the "first-in-first-out" rule produces constant irregularity; and the greater the irregularity the greater the need for a good "margin of safety" in planning working hours. Both this rule and the rule of having every round trip occupy two "days," instead of one day as in the good old times of our boyhood, are undoubtedly "here to stay"; but it does not seem possible that either can ever be other than a hindrance to the regular and healthful arrangement of freight trainmen's working hours.

Most active men of affairs have had occasion

during a busy life to exert themselves for long periods without sleep. Most railroad officers of the kind who have worked themselves up from the bottom have had occasion to do active work for more than 16 hours and do it for several consecutive days, where convulsions of nature or riot and anarchy have made such work necessary. Men who have had this experience, however, have a very definite idea of physical and mental limitations, and it is safe to say that they have not deliberately laid out work for their employees that would come anywhere near the limitations imposed by the Indiana law. Why, then, is the law passed? Is it simply demagoguery or did the legislators have any facts upon which the inhibition might be based? If it has any real application it would seem to have for its object precisely the reverse of its apparent intention; that is, by implication, to permit work of as much as 16 hours a day provided it is not consecutive. Apparently it would permit such excessive work in that form of operation of suburban trains on steam roads and of electric interurban roads which is called "split tricks." For example, if a trainman's trick was from 5 a. m. to noon, from 1 p. m. to 6 p. m. and from 7 p. m. to midnight he would work a total of 17 hours a day; but he would not violate this Indiana law. Of course, working at such a pace he would soon render himself useless and before doing so would in all probability cause loss and damage to his employers, the cost of which would be difficult to forecast. The motive for the law would therefore seem to be idiocy on the part of the legislators; or a wicked conspiracy by great railroad corporations to secure legal right to ruin the lives of trainmen, as a walking delegate might sweetly interpret.

#### April Accidents.

The condensed record of the principal train accidents which occurred in the United States in the month of April, published in another column of this issue, contains accounts of 19 collisions and 12 derailments. Those which were most serious, or which are of special interest by reason of their causes or attending circumstances occurred as follows:

	Killed.	Injured.
14th—Bronxville, N. Y. ....	5	15
20th—Red House, N. Y. ....	5	10
26th—Buffalo, Kan. (laborers).....	11	25

April furnishes, as usual, a comparatively light record of train accidents; but with the enormous mileage and business of the present time it is important to lay emphasis on "comparative"; our lightest monthly record is bad enough. The three collisions which are tabulated—Bronxville, Red House and Buffalo—occurred respectively under the automatic block system, the manual block system and no block system. The first appears to be simple disobedience of the "under-control" rule. There is an easy curve in the line at the place where this accident occurred, but there was no question of sleepiness or lack of intelligence or unfavorable grade or inadequate brake power, or any of the stock excuses. "Under control" means to be able to stop within the space that can be seen to be clear, in advance of the tip end of the cow-catcher; but long familiarity appears to breed contempt, here as in less important matters. This case also throws light on the theory that an engineer who runs on the busiest lines will more surely maintain a constant vigilant habit than one who has an easy run and who may often loosen the rules without getting into difficulty. This engineer runs over one of the busiest lines in the country and had just come off from a section worked by the controlled manual block system, with its highest requirements. But he had got about 10 miles away from the last manual block-station, and evidently had allowed his mind to wander a still greater distance from the restrictions there imposed. Whatever the remedy may be, all the facts and the mental attitude of this engineer are perfectly clear. He obeyed the manual signals, with a man in the tower; and immediately afterward he did not obey the automatic distant and home signals. His first words in reply to a question—"I was drifting and looking, but it was foggy"—show his attitude toward a warning signal where there was no man stationed to report him for over-running it. Safe running on automatic signals requires that higher ethical standard in discipline which was enthusiastically outlined by the D., L. & W. correspondent in these columns last week; the substance of which is: "Don't disobey, even if you don't get caught at it."

The cause of the Red House collision was briefly discussed in the *Railroad Gazette* of April 24. It will be remembered that it was a case where if the signal man had had suitable electric control of a switch several thousand feet from his cabin he would not have made the mistake that he did. It is gratifying to be able to record that the use of electric locks for this purpose, which was begun on this road (the Erie) several years ago is being constantly extended, and that the company has already put in service about 100.

The third collision, occurring on an obscure line, and killing no passengers, will not be a prominent item in newspaper history; but it is a deplorable tragedy. If the same victims had been sailors drowned within 100



miles of New York or Chicago they would have figured as heroes. Last January near Chiwaukee, Wash., 12 workmen were killed in a collision of about the same kind as this; and, five months earlier, nine or more were killed and 30 injured on a gravel train at Rhodes, Iowa. One of the most pronounced elements in the satisfaction that is felt by the superintendent who introduces the absolute block system is that under it all trains are protected with equal security, without regard to their relative grade on the time-table, or the social or financial importance of the persons who are in or upon them. This simplification of the trainmaster's and despatcher's duties is well worth large expenditures; it heightens the security not only of laborers who are identified by numbered tags, but also of thousands of passengers on extra trains.

A passenger train on the Mexican National was derailed and wrecked near Saltillo, April 24, and three passengers were reported killed. Near Windsor Junction, N. S., on the night of the 11th, there was a butting collision between a passenger train and a freight, resulting in the death of five persons. The freight had passed a station where a stop signal was displayed against it; the explanation of this error on the part of the engineman is given in the newspapers as follows:

"Engineer Copeland says that the whistle cord had broken or become detached and he went out on top to fix it. While he was at work, steam from the safety valve or the whistle blew out, striking him in the face, causing burns which still remain, and knocking him senseless. He knew nothing more, he says, until he was picked up after the collision."

The electric-car accidents recorded in the newspapers in April number 15; two persons killed and 68 injured.

#### Michigan Central.

In spite of a decrease of 114,545,820 ton-miles, freight earnings for 1902 increased from \$12,858,455 to \$13,279,220. The gain was made partly on local freight, which increased \$420,765, and partly because of better rates on the through traffic, the average rate per ton per mile being .520 cent, as against .456 in 1901. As is usual in the reports of this company, information as to the causes of traffic changes is scanty. It may be presumed, however, that the Michigan Central decreased ton miles and increased rates as a result of the relative scarcity of agricultural products and the increase in higher class manufactured commodities, as was the case with the Lake Shore, operating in the same general territory. Battle Creek is a good example of the cities which have doubtless contributed largely to this profitable kind of traffic in the last year or so.

Similarly, the passenger traffic shows a decrease of 2,590,653 in passenger miles, and an increase of \$74,838 in earnings, assignable to a return to normal through traffic at normal rates, after the Pan-American exposition, and to quite a little increase in local business. Gross passenger earnings were \$4,719,068, as against \$4,644,230 in 1901, \$3,889,756, in 1900, and \$3,600,024, in 1899.

Operating expenses and taxes were \$15,467,504, as against \$14,745,964; an increase so heavy that it occasioned a decrease in net earnings of over \$166,000. This was fortunately offset, however, by the replacement of old securities bearing a high rate of interest with new ones calling for a much lower sum, so that interest charges were reduced \$244,736, and the total net revenue, after deducting the proportion due the Canada Southern, and adding income from investments, was \$1,110,646, as against \$983,296, last year. Four per cent. dividends were paid, as for some years, amounting to \$749,520, and a balance of \$361,126 remained. Of the increase in operating expenses, \$614,344 was charged to conducting transportation. Fuel cost \$261,842 more than in 1901; station service, \$107,499 more, and track rentals and terminals, \$110,030 more. Maintenance of way and structures contributed \$325,851 to the increase; \$3,768,140 having been charged to that account during 1902, or about \$2,279 per mile of main line worked. Maintenance of equipment, however, decreased from \$2,764,762, in 1901, to \$2,380,654, in 1902.

In addition to the maintenance charge, which covered only repair work and renewals, \$869,904 was charged to the construction account. Of this, the largest item, \$379,396, was spent for a second track from Jackson to Marshall, 32 miles. A total of \$287,647 was used for grade reduction, and \$133,410 was paid on account of new shops at Jackson. A considerable fund is at present available for construction, since \$18,000,000 3½ per cent. 50 year first mortgage bonds were authorized last spring, and \$10,000,000 of these sufficed to pay off the old 7 per cent. and 5 per cent. consolidated first mortgage bonds, which matured May first. The remainder of the authorized issue is available for betterments.

	1902.	1901.	Increase.
Gross earnings .....	\$19,045,083	\$18,490,274	\$554,800
Operating expenses .....	15,467,505	14,745,964	721,500
Net earnings .....	3,577,579	3,744,310	*166,731
Interest and rentals....	2,210,778	2,455,514	*244,736
Net income .....	1,110,646	983,296	127,350

\*Decrease.

Under date of May 12, as reported in our news column last week, J. P. Morgan & Co. offered, on behalf of the Chicago, Rock Island & Pacific, to buy any or all shares

of the common stock of the St. Louis & San Francisco, provided 225,000 or more shares were deposited before June. The Rock Island will pay, for each share of common stock so offered, of par value of \$100; \$60, par value, in Chicago, Rock Island & Pacific five per cent. gold bonds of 1913, and \$60, par value, in common stock of the Rock Island Co. (of New Jersey), and the plan is endorsed by Messrs. Yoakum, Pierce, Campbell, Porter, Cheney and Bixby, as principal stockholders of the St. Louis & San Francisco. The fact that these gentlemen have given their assent to the plan would seem a strong indication that it will go through. The combination will involve about 13,000 miles of line actually built, with prospect of considerable addition when lines now building and definitely projected are finished. It includes, of course, the Choctaw, Oklahoma & Gulf, the Chicago & Eastern Illinois, and other recently acquired component parts of the two systems involved. A simple purchase of stock, as in the above case, would seem to be the easiest and most secure way of preventing harmful competition between lines serving, to a greater or less degree, the same territory. But the lines of the Rock Island system and of the St. Louis & San Francisco are sufficiently divergent so that it does not seem likely that the courts will be called upon to determine whether or not the combination is in "restraint of trade," even though such a construction of the law may be held to apply to companies owning a controlling interest in the stock of a parallel line.

#### NEW PUBLICATIONS.

*British Standard Sections.* Issued by The Engineering Standards Committee, New York: D. Van Nostrand Company, 1903. Price \$1.00.

This pamphlet contains a number of tables and sketches of the shapes and sizes of the common structural forms as recommended by the engineering societies of Great Britain. Each sheet is headed with a sketch giving the form of the shape, and below is printed a table of dimensions of each element for different sizes and weights. Some general specifications are also printed with the tables. The shapes shown are equal and unequal angles, bulb angles, tees, and plates, Z bars, T bars, channels and I-beams. The announcement is made that at a later date complete tables giving the properties of the shapes here shown, will be published.

*Flexure of Beams.* By Albert E. Guy, New York: D. Van Nostrand Co., 1902. Price \$1.25.

There are many problems in engineering which are dealt with at length in text books and finally summed up by remarking that the formulæ deduced apply only to the simple case considered, and that their use in other more complex calculations must depend on the good judgment or more properly good guess-work of the designer. Cut and try is the method advocated when the science of mathematics fails. In the opening chapters of this work, which is little more than a memoir of a number of experiments carried out in an attempt to discover if possible the laws governing the buckling of loaded beams, the simplest problem in the design of a beam is given and subsequently it is shown how entirely inadequate the information at hand is for its solution. It is required to design a beam of minimum volume to support a load P acting perpendicularly to the length L. Nothing in the subject of strength of materials could be more simple and yet heretofore it was impossible with the aid of mathematics alone to determine the shape of the section. Considering the square and circular sections the solution of the equation  $P \times x = F \frac{I}{a}$  involves only one unknown

in the expression for I, but in the case of the rectangle or any other section, two or more unknowns are involved, and with no other satisfactory equations for combination and elimination the value of one or more of the unknown quantities must be assumed and the others derived from it. The equations for transverse and longitudinal shearing which are usually neglected in the first calculation may sometimes be so combined with the above equation as to give absolutely ridiculous results in the solution for the dimensions of the section. The equation for deflection alone, usually gives quite useless values and the problem is no nearer a rational solution than before.

The factor which has always been neglected, chiefly because there was no experimental data or adequate mathematically derived equations expressing it, is that of lateral bending which is analogous to buckling in columns. Many volumes have been written and much experimenting carried out in the investigation of column formulæ, and such eminent mathematicians and engineers as Euler and Rankine and Hodgkinson have by their successive researches given to the engineering profession a comprehensive series of formulæ on which to base calculations involving the strength of columns. It has remained for the author of this book to discover experimentally and apply mathematically the similar laws for beams in flexure. A long series of tests in which the results were repeatedly verified brought out the valuable and highly interesting laws which are discussed at length in these pages. The apparatus was ingeniously devised to produce the conditions of loading and support for the specimens most nearly approaching the theoretical case always assumed in dealing with problems of this kind. The specimens were strips of white pine carefully selected and free from imperfections, and the modulus of elasticity was ascertained for each by the

usual method of measuring the deflection under a known load. They were rectangular in section and varied in size from ¼ in. x 1 in. to ¼ in. x 2 in. Briefly stated the laws for flexure or lateral bending of beams as set down here are: First. The load causing buckling is inversely proportional to the square of the length on which it acts directly, or in other words, between supports. Second. It is directly proportional to the moment of inertia of the beam referred to an axis through the center of gravity of the beam parallel to the direction of loading; in the case of a rectangular beam, directly to b³h. Third. The total effect of several forces or their components is equal to the algebraic sum of their individual effects. Stated algebraically the first two laws

may be written,  $P = K \frac{b^3 h}{L^2}$  which bears a close and striking relation to Euler's familiar formula for columns,  $P = \frac{K \pi^2 EI}{L^2}$ .

To utilize this formula for determining the value of b, having found the minimum value of h for a given or required deflection from the derived equation  $d = \frac{KFL^3}{Ea}$

where a is a function of h, it is only necessary to substitute the value h in the equation expressing the first two laws and solve for b, using a factor of safety, recommended by the author as 2. Here, then, the limiting values of b and h are found and it remains only to find the minimum area of section within these limits.

In concluding his work the author gives solutions for a few of the cases most often met with, using the methods outlined in the preceding chapters. One chapter is also devoted to the analysis of beams of uniform strength and the demonstration of a rigorous rule for determining the forms of such beams. The book is a valuable acquisition to the literature of mechanics of engineering and strength of materials, and paves the way for more thorough research in a very obscure field. It contains 122 pages and is bound in cloth.

#### TRADE CATALOGUES.

*Brown & Zortman Machinery Co.,* Pittsburg, Pa., has just issued a very handsome and artistic catalogue of the Colburn universal saw table for which it is the selling agent. Being built at a plant making machine tools it has many of the constructive features of a modern metal working tool, a careful distribution of metal where most needed, accurately ground bearings, interchangeable parts and handsome but durable finish. As its name indicates this tool will do any class of work of which a circular saw is adapted. The table is 42 in. x 40 in., with a sliding table 40 in. x 12 in. It may be tilted at any angle up to 45 deg. Each machine is furnished with two 14 in. saws, one rip and one crosscut, or if desired one 16 in. and one 12 in. saw may be used together, or one 18 in. saw singly. The splitting fence and cutting-off gage may be set at any angle, all adjustments being quickly and accurately made. It is an ideal tool for general sawing.

*Buffers and Grinders.*—The Storey Motor & Electric Co., Harrison, N. J., has decided in the future to issue its general catalogue in sections devoted to each particular class of direct current electric machines which it makes. Section A, just published, contains a detailed description of the various types and sizes of buffing and grinding machines with direct connected dust proof motors, of which the company makes a specialty. These machines are made in two forms, a column type and a bench type. General information for the users of buffing and polishing machinery is given in the last pages of the pamphlet with some valuable hints as to the methods of obtaining best results with different metals.

*Grinding* is the title of an attractive little book which the Norton Emery Wheel Co., Worcester, Mass., is sending out in which is reprinted an article on this subject by Chas. H. Norton which appeared in the *American Machinist* recently. It is full of food for thought for those who do or should use grinding wheels.

*Points on Packing* is the title of a small pamphlet sent out by Jenkins Brothers, New York, in which is described the merits and uses of the well-known Jenkins packings and gaskets.

#### A Self-Cooling Transformer.

The accompanying engravings show the appearance and construction of a standard type of self-cooling, oil insulated transformer for high potential circuits made by the Westinghouse Electric & Mfg. Co. It is similar in design to the smaller transformers made by the same company, being only slightly modified for the service for which it is intended. The construction is shown in Fig. 1. Both the high and low tension windings are divided into a number of flat coils, the high tension conductor being a flat copper ribbon wound concentrically with one turn per layer. The layers are separated from each other by a special insulating material in addition to the cotton covering of the conductor, while the coils are individually insulated from each other by heavy washers. This construction practically eliminates any danger of breakdowns between layers or separate turns, a common

trouble with transformers. The low tension is wound in the same way with conductors of rectangular section. The wires are paralleled and arranged to eliminate eddy currents which may be set up.

With this method of winding the total E. M. F. is divided among many coils and E. M. F. between layers is reduced to that of a single turn. In case of damage to a coil another may easily be substituted and the regulation of the transformer is greatly improved by the interlacing of coils which is possible.

The chief advantage of oil insulation is the heat conducting power of the oil which keeps down the temperature of the transformer. In a 500 k.w. machine of 98.5 per cent. efficiency the loss at full load is  $7\frac{1}{2}$  k.w. or 10 h.p., which appears as heat and must be dissipated to prevent a dangerously high temperature. This may be done by simple radiation from the surface of the containing case; by the circulation of water through pipes immersed in oil; or by the constant removal of the heated oil and its return after having been cooled. The first simple method of direct radiation from the case is

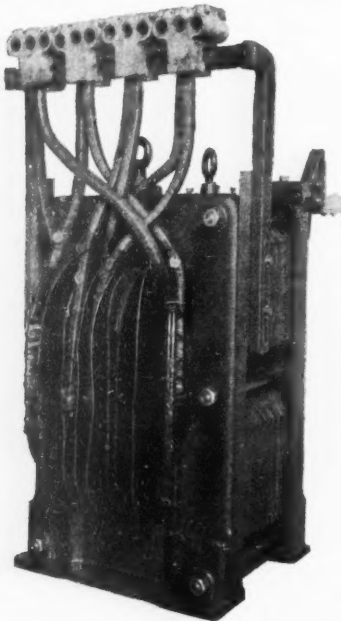


Fig. 1.—Westinghouse Self-Cooling Transformer.

the one used in this type of transformer. As shown in Fig. 2, it is mounted in a heavy sheet-iron case, the surface area of which is increased by corrugations. It is protected by an outer framework of angle iron.

The circulation of the oil between the coils and through the iron is important since a poor circulation allows the interior of the transformer to attain a higher temperature than that of the exterior, resulting at times in the destruction of the insulation by unequal contraction and expansion. The iron and copper both require a low and uniform temperature to prevent deterioration. In these transformers oil passages or ventilating ducts between the coils and in the iron, provide for an even heat distribution. When the machine is in operation a vigorous circulation of oil is set up by gravity through the interior of the winding and the ducts between the iron laminations.

The high tension terminals are mounted on a marble slab at one end of the transformer, the leads being brought out through the bushings. The low tension terminals are mounted at the opposite end of the transformer on a steel bar heavily insulated with mica.

The losses due to reversion of magnetism in the iron

and that resulting from the passage of the current through the copper conductors have been reduced to a minimum by a careful proportioning of the iron and copper. Particular attention has been paid to the im-

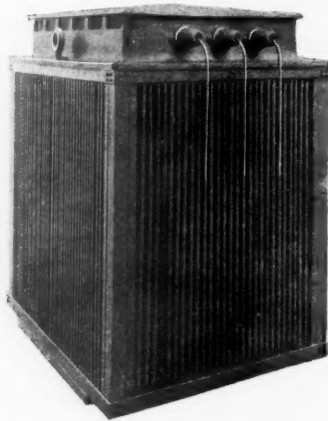


Fig. 2.—Westinghouse Self-Cooling Transformer.

portant feature of regulation. The winding may be adapted to almost any voltage desired, the standard voltages of 2,200, 6,600, 11,000, 16,500, 22,000, 33,000 and 44,000 being usually employed. By the use of taps brought out from the high tension winding for three lower voltages it is possible to use duplicate transformers at both ends of the line, the taps on the lowering transformers accommodating them to the reduced line voltage. Machines of a capacity not more than 150 k.w. may be wound for voltages as low as 50 and larger sizes as low as 100. Either or both windings may be divided into two equal parts so arranged as to permit either series or multiple operation, the change being made by a simple rearrangement of connections on the terminal block. These machines are made in any size from 10 to 500 k.w. units and for voltages up to 44,000.

#### Lehigh Valley Coal Pockets at Newark.

The new coal pockets at the corner of Pennsylvania avenue and Poinier street, Newark, N. J., were placed in operation in November, 1902, and have proved successful. The essential elements of the design are a gravity feed for loaded cars from the storage yard to the foot of an inclined plane, up which cars are hauled by cable to the top of the pockets. The cars then drop entirely by gravity the length of the pockets and thence by a gravity switchback into the return track for empty cars.

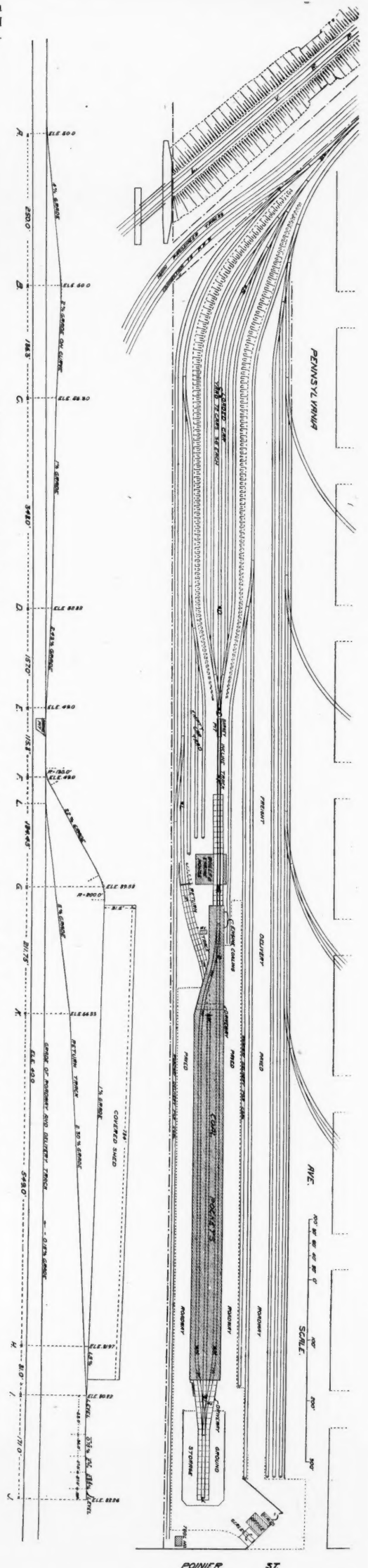
The noteworthy features are the selection of the track gradients and the provision made for screening the coal as it leaves the pocket and for the rescreening of the screenings, so as to separate automatically the small sizes of coal from the dust.

The capacity of the yards is: Seventy-two loaded cars; 148 empty cars; surplus standing room for 58 additional cars, and track delivery for 46 cars. All cars are figured 36 ft. The loaded cars are dropped down by gravity to the foot of the incline over the depressed "Barney" or "dummy" pit, and at a given signal the "Barney" is brought up back of the cars and finds its bearing on the buffers of the cars.

At the head of the incline the cars are switched by gravity to either side of the structure and are stopped over the desired pocket or bin where they are discharged. When empty they are run by gravity out on the tail track and return automatically over the three-way switch (which always stands set for the return track), down the return track in the center of the structure, and out into



Lehigh Valley Coal Pocket at Newark.

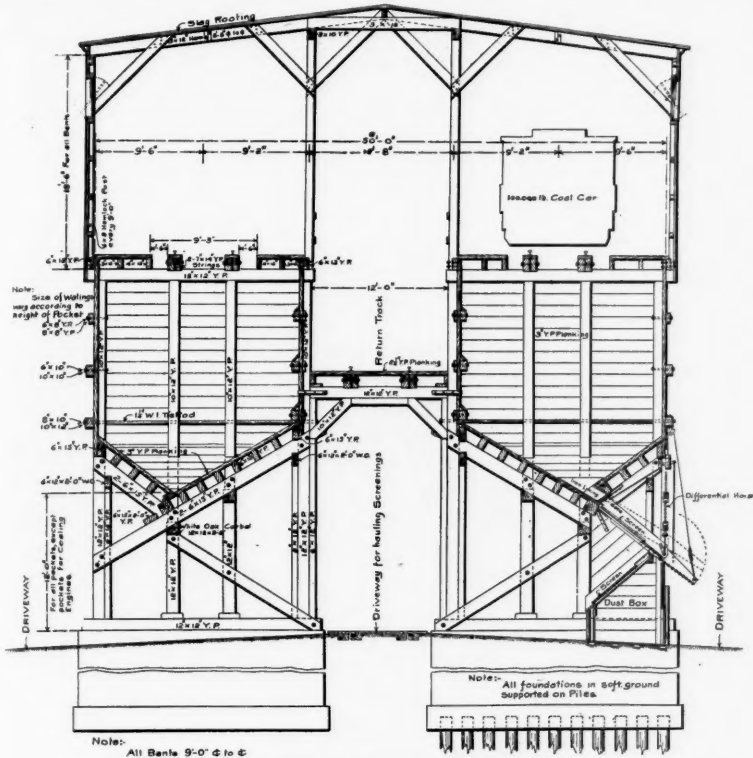


General Layout of Storage Tracks and Coal Pockets at Newark, N. J.—Lehigh Valley Railroad.



the yard for empty cars, where the trains of empty cars are formed for the road engines to haul away without additional switching being necessary.

The delivery of coal to wagons is done on the two sides of the structure, with dust boxes along the outer face and ample space for the small screened coal back of the dust boxes. A driveway for carts is provided under the structure, below the return track, for the collection of screenings. There are 150 pockets (capacity 55 to 80 tons each) with individual outlets for delivery to wagons, and three pockets for engine coaling. The total storage capacity of pockets is 10,500 tons without trimming, and an additional capacity of 1,500 tons if pockets are trimmed.



Cross-Section Through Coal Pocket.

There is a ground storage (used for small sizes) at the north end under the tail track trestle with a capacity of 4,000 tons, making a total storage capacity of 16,000 tons of 2,000 lbs. each.

The work was designed and built under the direction of Walter G. Berg, Chief Engineer, Lehigh Valley Railroad, assisted by E. D. B. Brown, Architect; J. G. Hocke, Division Engineer, and E. F. Ackerman, Assistant Engineer.

The contractors were: For the structure, Messrs. Geo. W. Rogers & Co., of 44 Broadway, New York city; hoisting machinery and boilers, the Exeter Machine Works, of Pittston, Pa.; Earle C. Bacon, Engineer, 26 Cortlandt street, New York city; paving, Holmes & Cogan, of Jersey City, N. J.

#### Train Accidents in the United States in April.<sup>1</sup>

unf, 1st, Marietta, Columbus & Cleveland, Napier, Ohio, passenger train No. 3 was derailed, apparently by a malicious obstruction, and the engineer and fireman were injured.

bc, 1st, 10 p.m., Cleveland, Cincinnati, Chicago & St. Louis, Rose Hill, Ind., butting collision between northbound passenger train No. 26 and southbound freight No. 65, badly damaging both engines. The engineer of the passenger and a brakeman of the freight were killed. It is said that the freight was running on the time of the passenger in consequence of a misunderstanding of orders.

unf, 1st, 2 a.m., Louisville & Nashville, Sparta, Ala., southbound passenger train No. 3 was derailed in consequence, it is said, of the malicious loosening of rails. Four passenger cars were ditched and two passengers were injured.

rc, 2d, Southern Railway, Afton, Tenn., a passenger train was run into at the rear by a freight. The rear car of the passenger, an empty sleeping car, was badly damaged.

xc, 2d, New York Central & Hudson River, Central Junction, N. Y., collision between a passenger train and a freight, wrecking two passenger cars and several freight cars. Three trainmen and two passengers were injured, one of them fatally.

\*rc, 3d, Atchison, Topeka & Santa Fe, Guadalupe, N. M., rear collision of freight trains, wrecking 10 cars, which took fire and were mostly burnt up. A brakeman caught in the wreck was burned to death and three other trainmen were injured.

unf, 3d, Central Vermont, Northfield, Vt., a passenger

<sup>1</sup>Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

#### ABBREVIATIONS.

- rc Rear collisions.
- bc Butting collisions.
- xc Miscellaneous collisions.
- dr Derailments: defect of roadway.
- eq Derailments: defect of equipment.
- dn Derailments: negligence in operating.
- unf Derailments: unforeseen obstruction.
- unx Derailments: unexplained.
- o Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

train was derailed by a landslide and the engine and three cars fell down a bank. The fireman was killed.

xc, 5th, North Shore, Tocaloma, Cal., a train of empty passenger cars collided with a gravel train, fatally injuring the conductor of gravel train and slightly injuring two brakemen. The engine of the gravel train was wrecked and two passenger coaches badly damaged.

xc, 6th, Southern Railway, Evinston, Va., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 12 cars. Three trainmen were injured.

bc, 8th, 2 a.m., Mobile & Ohio, Chunchula, Ala., butting collision of freight trains, badly damaging both engines and several cars. One fireman was killed and three trainmen were injured.

xc, 9th, Philadelphia, Baltimore & Washington, York Furnace, Pa., a freight train collided with a work train and 25 cars were derailed and fell down a bank into a river. One engine was wrecked. Four employees were injured.

dr, 10th, Central of New Jersey, Elizabeth, N. J., a switching engine was derailed at a point where the track had been weakened by a heavy rain, and fell down a bank into a swamp. The engineer and one brakeman were killed and the fireman was fatally injured.

eq, 10th, New York, Susquehanna & Western, Butler, N. J., several cars in a freight train were derailed by the breaking of a wheel, and, after running some distance, broke through a bridge and fell into the Pequannock River. The whole bridge gave way.

unx, 11th, Fort Worth & Rio Grande, Fort Worth, Texas, a freight train was derailed and the engine was overturned. Two employees were killed.

rc, 11th, Lake Shore & Michigan Southern, Ashtabula, Ohio, a passenger train which had been unexpectedly stopped by a freight train ahead was run into at the rear by a following empty engine. The fireman of the empty engine was killed and the engineer was injured; three passengers and three employees on the passenger train were also injured.

unf, 13th, Southern Railway, Lexington, N. C., passenger train No. 97 was derailed by a stone which had fallen on the track, and the engine and several cars were ditched. The engineer and fireman were killed.

rc, 14th, New York Central & Hudson River, Bronxville, N. Y., northbound passenger train No. 139, which had been unexpectedly stopped, was run into at the rear by a train consisting of a locomotive and one baggage car, the "American Express Special," and the rear car of the passenger train was crushed at the rear end. One express messenger and 15 passengers were injured; injuries mostly slight. The engineer of the baggage-car train passed an automatic distant signal and also the corresponding home signal, both set against him, without making a suitable reduction in his speed. Train 139 had been stopped about two minutes and the rear brakeman was held to be at fault for not promptly signaling the train following.

\*rc, 14th, Pennsylvania road, Frankford, Pa., rear collision of eastbound freight trains, badly damaging the engines and several cars. The wreck took fire and was mostly burnt up.

rc, 15th, Lake Shore & Michigan Southern, Conneaut, Ohio, a westbound passenger train ran into the rear of a preceding freight, badly damaging the engine of the passenger and the caboose of the freight. Two men riding in the caboose were badly injured.

dn, 16th, 3 a.m., Louisville & Nashville, Castleberry, Ala., passenger train No. 3 was derailed at a misplaced switch and the engine and forward cars were badly damaged. One mail clerk and one fireman were killed and four other trainmen were injured.

rc, 17th, Northern Pacific, South Heart, S. Dak., passenger train No. 4 ran over a misplaced switch and into the rear of a freight train standing on the side track. The engine was overturned and the mail car was wrecked. The fireman was killed and the engineer fatally injured.

\*xc, 20th, 3 a.m., Erie road, Red House, N. Y., collision between an eastbound passenger train and a westbound freight, wrecking the passenger engine and several freight cars. The wreck took fire and was mostly burnt up. Five passenger cars were consumed. One mail clerk and four passengers were killed and five trainmen and five passengers were injured. The bodies of most of the dead were burned beyond recognition. The freight was entering the side track and was struck in the side by the passenger train, running at full speed. There was a dense fog at the time and the collision was due to the failure of a block signal operator and of the men on the freight train to stop the passenger train. This accident was reported in the *Railroad Gazette* of April 24, pages 298 and 302.

eq, 21st, Chicago & North Western, Harlan, Iowa, a mixed train was derailed by the breaking of a flange, and one passenger car was overturned. Two passengers and the conductor were injured.

dr, 21st, St. Louis & San Francisco, Everton, Mo., passenger train No. 103 was derailed by a broken rail and the engine was overturned. The first three cars were wrecked and three passenger cars were ditched. The engineer, fireman and three mail clerks were killed.

21st, Pacific Coast Railway, San Luis Obispo, Cal., a freight train was derailed and the caboose fell down a bank. Of 20 laborers riding in the caboose one was killed and several others were injured.

\*xc, 22d, Chicago, St. Paul, Minneapolis & Omaha, Spring Valley, Wis., part of a mixed train, one passenger car and two freight cars, which had been left standing on a 2 per cent. grade, escaped control and ran back some distance to the foot of the grade, where it collided with a switching engine, wrecking the passenger car and doing other damage. One passenger was killed and two passengers and two employees were injured. It appears

that the front portion of the train had been cut off and moved to the top of the grade in consequence of the inability of the engine to pull the whole train. The failure of the brakes to hold the cars which had been left standing is not explained.

\*rc, 23d, Southern Railway, Lynchburg, Va., a passenger train ran into the rear of a preceding freight, wrecking the engine and several cars. The wreck took fire and most of it, including two mail cars and two freight cars, were burnt up. The passenger engineer was killed and one postal clerk was injured.

rc, 26th, 7 p.m., Missouri Pacific, Buffalo, Kan., a live stock train ran into the rear of a preceding work train consisting of a caboose and a number of platform cars. The caboose and several cars were wrecked and 11 employees were killed and 25 injured. Four of the injured were classed as fatally hurt. The collision is said to have been due to a mistake in reading a train order.

dn, 28th, Cincinnati, Hamilton & Dayton, Bates, Ohio, passenger train No. 13 was derailed at a derailing switch and 13 persons were injured.

\*xc, 29th, Terre Haute & Indianapolis, Terre Haute, Ind., the second section of westbound passenger train No. 21 collided with a switching engine, making a bad wreck. One passenger, one trainman and one other person were killed and about 20 other persons were injured, two of them fatally.

bc, 30th, 1 a.m., New York, New Haven & Hartford, Stormville, N. Y., butting collision of freight trains, one of which was drawn by two engines. The three engines and 18 cars were wrecked. One fireman was killed and five other trainmen were injured. It is said that the collision was due to confusion in telegraph orders.

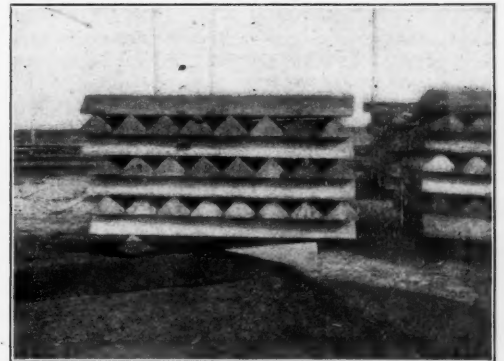
#### Triangular Ties on the Great Northern.

Ties of the shape shown in the accompanying illustrations have been made at the Great Northern's plant at Kalispell, Mont., since the spring of 1902. The standard cross sections, which are also reproduced, show that a considerable saving in timber is effected by the use of a

Section of Ties	B. M. in Tie	Section of Ties	B. M. in Tie
	37 1/2		32
	32 1/2		48
	37 1/2		80
	42		

Standard Tie Sections, Great Northern.

tie of this shape whenever the size of the log is adapted to economical cutting. Of course, no statistics as to durability are available, as the first tie laid has only been in the ground a little over a year, but no trouble has been found as yet and the company believes that the ties will last fully as long as those of any other shape. The triangular ties have made no trouble by crawling (an action which was feared because of their shape),



Triangular Ties, Great Northern.

and they tend constantly to tamp themselves. At present, ties are sawed this shape whenever the timber which comes in is of the proper size, the different standard cross sections illustrated being used indiscriminately according to circumstances. The zinc-chloride process of treatment is used at the Kalispell plant.

We are indebted to the New York Railroad Club for the illustration showing the pile of these ties.

#### Railroads of Ireland.

The Department of Agriculture and Technical Instruction for Ireland has published statistics of Irish railroads since 1872. In 1901 the total length of lines open was 3,208 miles, as against 2,895 in 1892; 2,465 in 1882, and 2,091 in 1872. Total receipts from all sources of traffic were £3,384,349, or £1,054 per mile, in 1901; £3,177,751, or £1,097 per mile, in 1892; £2,810,876, or £1,140 per mile, in 1882, and £2,421,265, or £1,158 per mile, in 1872. Earnings have decreased about \$500 a mile in 30 years, that is; and there has been a slight

but quite regular falling off of profits, keeping even pace with the increase in the length of lines worked. On the other hand, total operating expenses, which in this case are made to include both interest and taxes, increased from approximately £614 per mile in 1872, to £626, in 1882; back to £600, in 1892, and up again to £750, in 1901. The probable cause for the diminished earnings is that the increased standards of maintenance, causing greater expenditures year by year, have not been offset either by increased traffic or by compensating increases in train load. As is usual with British railroad statistics, no ton-miles are given, so the train load cannot be estimated. But in 1872, goods and mineral trains traveled an aggregate of 2,678,967 miles to carry 2,565,807 tons of freight, from which the receipts were £1,062,170, or about \$1.93 per train mile. In 1901, 5,376,025 miles were traveled by freight trains to haul 5,136,624 tons, from which the receipts were £1,694,837, or about \$1.57 per train mile. These figures do not take into account a considerable mileage of mixed trains, since no data is given for the freight so hauled, but the mixed train mileage has remained at an approximate proportion which has not changed much in the period considered. Hence the train-mile earnings, which would in reality be slightly less than the figure quoted, on account of the additional mixed train mileage in the division, maintain a correct proportion by which they can be compared.

A comparison with American train-mile showings would be obviously futile, on account of the "retail" nature of British freight. But if it is granted that the Irish freight traffic must be handled in this "retail" manner, the figures would raise a pessimistic doubt as to the ultimate value of expensive betterments, which make no improvement in the economy of working the road. The following table, based on the official statistics, summarizes the situation.

	1872.	1901.
Miles worked .....	2,091	3,208
Gross earnings* .....	\$11,767,338	\$18,634,936
Gross earnings, per mile .....	5,628	5,122
Freight earnings .....	5,162,146	8,236,908
Freight earnings, per mile .....	2,469	2,567
Freight earnings, per train mile .....	1.93	1.54
Passenger earnings .....	5,512,615	7,579,593
Passenger earnings, per mile .....	2,636	2,362
Passenger earnings, per train mile .....	96 cents	70 cents
Annual expenses .....	6,243,326	11,699,016
Annual expenses, per mile .....	2,984	3,630

\*£1 taken at \$4.86.

#### United States Commerce With South America.

The Philadelphia Commercial Museum has published a brief statistical review of our commerce with South America, accompanied by diagrams which show graphically how small a share we are enjoying of the trade which would seem naturally to belong to us. For example: the United States buys more of the products of Brazil than Great Britain, France and Germany combined, yet Brazil imports 2½ times as much from Great Britain as from the United States. The leading exports of Brazil are coffee, rubber and sugar, and of these the United States buys nearly one-half. Argentina is the only South American country whose products compete with those of the United States in the markets of the world. Naturally, most of these products are sold to Europe. Wool is the leading product and is sent mainly to the continent of Europe. Hides and skins, about one-fifth of which are sold to the United States, maize, wheat and flax are the other chief products. As regards Chile, over two-thirds of the exports consist of nitrate of soda, which is sold almost entirely to Europe. Eighty per cent. of the exports of South America are from these three countries.

The Commercial Museum considers that a more intimate knowledge of and a disposition to cater to the needs and also to what may be called the whims of the people of these countries, would greatly increase our

Commerce of South America in 1900—Aggregate of Imports and Exports, \$821,000,000.

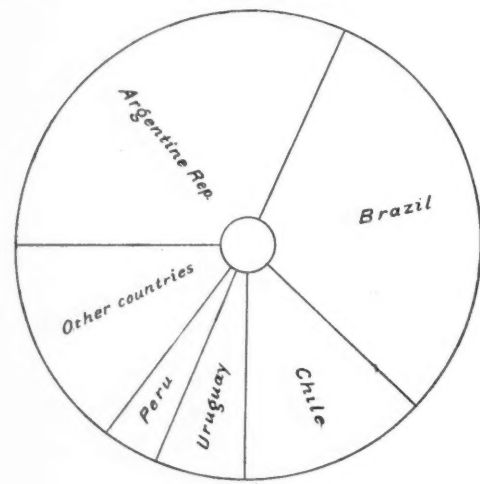


Fig. 1.

Values Given in Millions of Dollars.

	Imports.	Exports.	Total.
Argentine Republic .....	109	154	263
Brazil .....	84	162	246
Chile .....	47	61	108
Uruguay .....	23	29	52
Peru .....	11	21	32
Other countries .....	50	70	120

trade. This can be aided by the dissemination of information regarding the business customs and the habits of the people of these countries, and this is one of the special features of the work of the Museum. In order to secure a larger share of the trade it is also considered that more direct steamship lines to the leading ports are needed and also banking houses in the leading cities of Latin America, controlled by United States capital. Salesmen from the United States should be familiar with the language of the country in which they desire to sell their goods, and this will be greatly facilitated by the increased study of Spanish in our schools. The diagrams following have been taken from advance sheets of the "World's Commerce and American Industries," now in press and soon to be published by the Commercial Museum.

Commerce of Argentina in 1900—Imports by Countries, \$109,500,000.

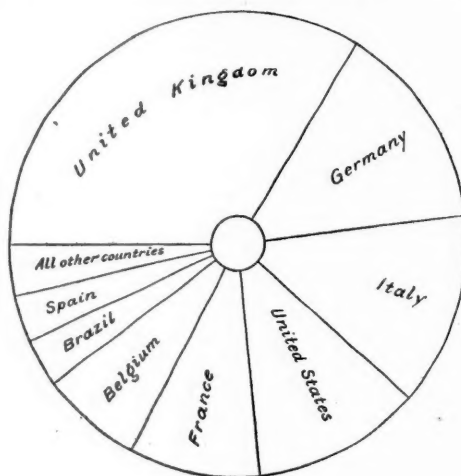


Fig. 2.

Values Given in Millions of Dollars.

United Kingdom .....	37.3	France .....	10.5
Germany .....	16.0	Belgium .....	8.1
Italy .....	14.4	Brazil .....	3.8
United States .....	12.9	Spain .....	3.5
		All other countries .....	3.0

Commerce of Chile in 1900—Imports by Countries, \$47,000,000.



Fig. 3.

Values Given in Millions of Dollars.

United Kingdom .....	15.4	Australia .....	3.3
Germany .....	12.5	France .....	3.3
United States .....	4.3	Peru .....	2.4
		All other countries .....	5.8

Commerce of Mexico in 1900—Imports by Countries, \$61,000,000.

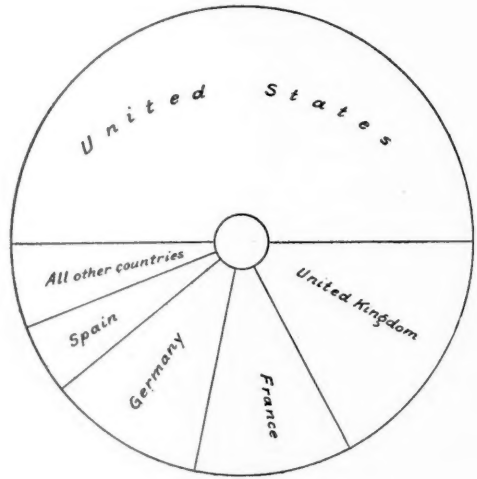


Fig. 4.

Values Given in Millions of Dollars.

United States .....	31.	Germany .....	6.6
United Kingdom .....	10.4	Spain .....	2.9
France .....	6.7	All other countries .....	3.4

#### Comparative Railroad Statistics for 1900.

The *Zeitung des Vereins deutscher Eisenbahnverwaltungen* for April 25, 1903, contains a careful compilation of figures covering the railroad systems of the leading European countries. They are herewith translated into the corresponding American units and brought into comparison with the figures relating to the railroads of the United States.

##### Mileage of Railroads, 1900.

	Miles.		Miles.
United States .....	192,556	United Kingdom .....	22,500
Germany .....	35,650	Austria-Hungary .....	21,730
Prussia .....	22,000	Belgium .....	3,960
Bavaria .....	4,250	Switzerland .....	2,420
Saxony .....	1,793	Holland & Luxemburg .....	2,000
France .....	28,400		

In extent of railroads in operation the United States easily leads. Germany stands second, France third, and the United Kingdom and Austria-Hungary fourth.

A different order is obtained if the railroad systems are arranged according to actual density, by miles to each 100 square miles. In this table Belgium, a small and densely populated country, leads, with Saxony a close second; the United Kingdom and Germany stand close together. The United States stands below even Austria-Hungary.

##### Miles of Railroad to 100 Square Miles, 1900.

	Miles.		Miles.
Belgium .....	35.	Bavaria .....	14.3
Saxony .....	30.7	Holland & Luxemburg .....	13.8
United Kingdom .....	17.9	France .....	13.6
Germany .....	16.8	Austria-Hungary .....	8.16
Prussia .....	16.1	United States .....	6.51
Switzerland .....	14.9		

If the density of railroads is based on the number of miles to 10,000 inhabitants, the resulting table puts the United States at the head, and France and Switzerland second and third.

##### Miles of Railroad to 10,000 Inhabitants, 1900.

	Miles.		Miles.
United States .....	25.44	Belgium .....	5.6
France .....	7.4	United Kingdom .....	5.3
Switzerland .....	7.3	Austria-Hungary .....	4.6
Bavaria .....	7.3	Saxony .....	4.3
Prussia .....	6.3	Holland & Luxemburg .....	3.4
Germany .....	6.2		

An arrangement of the countries in question according to the relative amount of their rolling stock gives the following results:

##### Rolling Stock per 100 Miles of Railroad, 1900.

	Passenger cars.	Freight cars.
United Kingdom .....	216	3,323
Belgium .....	203	2,610
Prussia (Government railroads) .....	122	1,512
Germany .....	123	1,410
France .....	120	1,210
Holland (Government railroads) .....	117	892
Switzerland .....	120	571
Austria-Hungary .....	75.2	810
United States .....	18	709.2

The relatively much larger number of cars of both kinds in foreign countries than in our own is due to their smaller size and the greater density of foreign traffic, as will be also illustrated in another way. The wide range between the United Kingdom at one extreme and Austria-Hungary and Switzerland at the other is noticeable. In the latter country the railroads evidently do a larger passenger business relative to freight than in other countries. Even the United States is better supplied with freight cars.

A comparison of the amount of railroad traffic in each country gives similar results:

##### Passenger-Miles per Mile of Railroad, 1900.

	Passenger-miles.	Increase, 1885-1900. Per cent.
Belgium .....	662,113	80.8
Prussia (Government railroads) .....	469,592	92.4
Germany .....	411,780	89.9
France (main lines) .....	369,113	80.8
Holland .....	325,892	94.1
Switzerland .....	321,028	71.9
Austria-Hungary .....	226,001	78.5
United States .....	83,295	12.3

##### Freight Ton-Miles per Mile of Railroad, 1900.

	Ton-miles.	Increase, 1885-1900. Per cent.
Prussia (Government railroads) .....	828,050	51.8
United States .....	735,306	84.2
Germany .....	699,955	62.5
Austria-Hungary .....	450,234	38.8
France (main lines) .....	434,469	32.4
Belgium .....	356,229	86.1
Switzerland .....	208,812	40.6

The enormous difference in density of passenger travel between the United States and foreign countries is striking. On the other hand, in freight density we stand nearly on a par with Germany, at the head of the line. The relatively greater increase in passenger than in freight traffic during the past 15 years is to be noted. The figures for the United Kingdom could not be obtained.

The following figures to indicate the capital investment per mile of railroad are perhaps open to criticism. However, they point out clearly the difference in the character of railroad construction to meet the necessities of the particular traffic, and also illustrate the American policy of financing betterments out of earnings. Great Britain stands first with its heavily and expensively built railroads, burdened with "debentures"; the Continental countries are far behind; and the United States brings up the rear.

##### Capital Investment per Mile of Railroad, 1900.

United Kingdom .....	\$255,000	Germany .....	\$97,150
France .....	131,000	Austria-Hungary .....	92,400
Belgium .....	115,000	Switzerland .....	87,400
Prussia (Gov. R. Rs.) .....	104,000	United States .....	61,885

The gross revenue per mile of railroad varies much as the above figures do. It is largest in the United Kingdom; Germany, France and Belgium stand on a par; and the United States is far behind, ranking below Austria-Hungary and Holland.

##### Gross Revenue per Mile of Railroad, 1900.

United Kingdom .....	\$22,700	Switzerland .....	\$11,200
Prussia (Gov. R. Rs.) .....	17,350	Holland (Gov. R. Rs.) .....	9,600
Belgium (Gov. R. Rs.) .....	15,670	Austria-Hungary .....	9,020
Germany .....	15,570	United States .....	7,722
France .....	15,250		



As to freight rates, the revenue of the railroads in the different countries from freight traffic per ton-mile indicates that Switzerland stands first; Germany, France and Austria-Hungary stand second and close together; Holland and Prussia somewhat lower, and the United States far below with its average revenue per ton-mile of  $\frac{1}{4}$  of 1 cent.

*Revenue per Ton-Mile, 1900.*

	Cts.		Cts.
Switzerland .....	2.63	Holland (Gov. R. Rs.)	1.19
France (main lines) ..	1.44	Prussia (Gov. R. Rs.)	1.08
Austria-Hungary .....	1.42	United States .....	.729
Germany .....	1.4		

As to passenger rates, the order is different. Our country stands first, and Austria-Hungary and Belgium last.

*Revenue per Passenger-Mile, 1900.*

	Cts.		Cts.
United States .....	2.003	France (main lines) ..	1.12
Switzerland .....	1.48	Germany .....	1.05
Prussia (Gov. R. Rs.)	1.36	Austria-Hungary .....	.915
Holland (Gov. R. Rs.)	1.23	Belgium (Gov. R. Rs.)	.78

Finally, the relative importance of freight to passenger traffic, at least as far as the revenue of the railroads is concerned, is indicated below. Our country stands at the head with Austria-Hungary; in France, the United Kingdom and Switzerland passenger traffic yields relatively more.

*Freight Revenue Per Cent. of Total Revenue, 1900.*

	Per cent.		Per cent.
United States .....	70.56	France (main lines) ..	53.88
Prussia (Gov. R. Rs.)	66.28	United Kingdom .....	51.02
Germany .....	64.36	Switzerland .....	49.23
Belgium (Gov. R. Rs.)	64.19	Holland (Gov. R. Rs.)	46.58

## TECHNICAL.

### Manufacturing and Business.

The Commonwealth Steel Co. has opened an office at 100 Broadway, New York city.

The Consolidated Car Heating Co. has received a contract from the Philadelphia Rapid Transit Co., to supply cross seat heaters for 515 cars.

The New York offices of the Pressed Steel Car Co. have been removed from the Empire Building, to the ninth floor of Blair & Co. Building, 24 Broad street.

Joseph B. Hall has given up his position as sales representative with the General Electric Co., Chicago, to become Chief Engineer of the McGuire Mfg. Co., Chicago.

In a plant recently installed in the South by the Pneumatic Engineering Company, 128 Broadway, New York, the air lift system pumps 9,000,000 gallons of water per day from four 10-in. wells.

The Soule Raw Hide Lined Dust Guard Co., Boston, Mass., is furnishing the dust guards for 1,000 steel cars now being built by the Cambria Steel Co. for the Chicago, Burlington & Quincy, as reported in our issue of April 10, 1903.

Ira C. Hubbell will sever his connection with the American Steel Foundries on May 31, owing to the increased demands on his time occasioned by his work in connection with the Kansas City, Mexico & Orient, and with the Locomotive Appliance Co.

The Standard Paint Co. has recently added a three-story brick and iron building, 375 ft. long, to its factory at Bound Brook, N. J. As the factory now stands, a building 500 ft. long will be devoted entirely to the manufacture of Ruberoid roofing. This company was organized in 1886, and was the first to make a water-proof insulating paper, and also the first to make the Ruberoid roofing. R. L. Shinwald is President of the company.

The Loomis-Pettibone Co. has increased its capital stock to \$2,000,000, and will build a plant near New York for the manufacture of gas engines in large units. In addition to the Loomis-Pettibone gas apparatus the company is now prepared to enter into contracts to equip complete plants; gas generators, gas engines and electric generators and motors. Until the new plant is ready to turn out large gas engines the company will act as agents for the engines made by Crossley Bros. Ltd., of Manchester, England. The company has recently installed several large gas engine plants in the United States and in Mexico.

### The Union Engineering Societies Building.

At a meeting of the representatives of the five organizations named by Mr. Andrew Carnegie, in his proposition to give to the four national engineering societies, and the Engineers' Club, a building for their joint use and occupancy, held, pursuant to call, at the Engineers' Club in New York city, on the evening of Friday, May 15, 1903, resolutions were passed as follows:

1. Resolved, That this Joint Conference Committee recommend to the respective governing bodies represented at this conference, that the following resolutions be brought before the several organizations to be acted on.

2. Resolved, That (insert name of organization) unite with (insert the names of the other four organizations) or any of them, for the purpose of accepting the sum of \$1,000,000 as a gift from Mr. Andrew Carnegie, for the purpose of erecting suitable buildings for occupancy by various societies of engineers and the Engineers' Club, on the sites secured for that purpose on the north side of 39th street and south side of 40th street west of Fifth avenue, in the City of New York, in the State of New York.

3. And resolved further, That (insert name of organization) has a very high appreciation of this generous gift of Mr. Andrew Carnegie, and this additional evidence of his recognition of the engineering profession and his deep interest in the welfare of the national societies of engineers and The Engineers' Club.

4. And resolved further, That a site on the north side of 39th street, shall be purchased and held by trustees, or otherwise as shall be determined by the joint committee hereinafter mentioned for the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining Engineers, or by such of them as shall vote in favor of coming into this enterprise.

5. And resolved further, That a joint committee shall be created to be composed of three members of each organization that shall unite in accepting said gift of \$1,000,000 from Mr. Andrew Carnegie; and that the governing body of (insert name of organization) shall elect three members of this organization to represent it on and be members of such joint committee; and that the governing body of (insert name of organization) shall have the right and power to remove any member of such joint committee who shall be elected by it and to elect any member of this organization to fill any vacancy that shall occur in such joint committee by reason of the death, resignation, refusal to act or removal of any member who shall have been elected by the governing body of this organization as a member of such joint committee.

6. And resolved further, That the character and internal arrangement of the building to be erected on the site on 39th street shall be determined upon by the affirmative vote of at least two-thirds of all of such of the members of said joint committee as shall represent all of the organizations, other than the Engineers' Club, on such joint committee; and that the character and internal arrangement of the club building to be erected on the site of 40th street, shall be determined upon by the affirmative vote of all of the three members of such joint committee who shall represent the Engineers' Club on such joint committee.

7. And resolved further, That said joint committee shall, by the affirmative vote of at least two thirds of all the members thereof, select and employ an architect to prepare the plans and specifications for the building to be erected on the site on 39th street, and for the club building to be erected on the site of 40th street; and shall also obtain proposals for the erection of both of such buildings; and shall have power to make and enter into such contract or contracts as shall be approved and authorized by the affirmative vote of at least two-thirds of all the members of said joint committee, for the erection of both of such buildings; and shall have charge of the erection of both of such buildings.

8. And resolved further, that said joint committee shall continue in existence until all of the purpose set forth in these resolutions shall have been fully accomplished.

## THE SCRAP HEAP.

### Notes.

The newspapers say that the Pennsylvania is to put on a new 25-hour train from Chicago to New York and that the time of the Pennsylvania Limited is to be reduced from 24 hours to 23. This reduction in time will require the increase of the fare from \$24 to \$25.

Press despatches of May 13 state that the strike of railroad employees in Victoria, Australia, was a failure. Public sympathy appears to have been entirely lacking. The newspapers give an abstract of a bill proposed in the Victoria Legislature for preventing strikes, the features of which are very drastic, but there is no indication of what prospect the bill had of being passed.

The failures of the coal-mine proprietors in West Virginia to get all of the cars desired for shipping coal, which have led to many disputes and some law suits during the past few months, have culminated in a suit by the Kingwood Coal Co. against the West Virginia Northern Railroad for \$90,000 damages for failure to furnish the plaintiff's mines with a fair share of cars.

Mr. E. E. Clark, chief of the Order of Railway Conductors, which held its biennial convention in Pittsburgh last week, says: "During the past six months this order has succeeded in having wages readjusted so that there has been a general increase on all the railroads of the United States, Canada and Mexico, with the exception of the Mobile & Ohio and the Great Northern."

In the bill which is now before the Canadian Parliament to authorize the construction of a railroad, in the interest of the Grand Trunk, to the Pacific Coast, there is a clause, which, according to the press reports, stipulates that the chief eastern terminus of the Grand Trunk shall be in Canada. The passage of the law in this shape apparently would mean the abolition of the Grand Trunk's export and import traffic at Portland, Me.

A press despatch from New Orleans appears to indicate that the ticket scalpers of that city have eluded the law. The State Supreme Court has handed down a decision on the application of the New Orleans & Northwestern vs. the Judges of the Civil District Court, refusing a mandamus to compel the judges of the court to show cause why they should not issue the injunctions prayed for, directed to the various scalpers of the city, enjoining them from trafficking in the excursion tickets to the Confederate Veterans' Reunion.

The St. Louis, Iron Mountain & Southern, and other roads in the Southwest, have made their answers to the complaints in the suit before the Interstate Commerce Commission alleging illegality in the division of rates

with logging railroads. The principal carriers in the southern yellow pine region appear to have made concessions very generally to the large lumber shippers by allowing the shippers to call their logging roads regular carriers and, on this assumption, giving these initial "carriers" a liberal share of the through rate. The answers of the railroad companies are printed at considerable length in the newspapers, but they may all be summed up in the single plea that, in order to foster the lumber business, it is necessary to make extraordinary allowances to the shippers.

The Minneapolis & St. Louis announces that the through freight tariff on hard coal from Duluth (over the Northern Pacific) to New Ulm, and other points west of Minneapolis, is to be cancelled; and it is reported that the State Railroad Commission will bring an action in the courts to compel the roads to rescind this action. The reason for the abolition of the tariff is that the rates, which were prescribed by the Commission in 1899, are held to be too low. The action of the Commission at that time was sustained by the courts, in spite of the remonstrances of the railroads; but the present attitude of the carriers appears to be that in consequence of the increase in the cost of transportation the rate, which was reasonable in 1899, is now unreasonably low. The decision of the United States Supreme Court sustaining the Commissioners' rates was rendered June 2, 1902.

The United States Supreme Court on Monday last reversed the finding of the Interstate Commerce Commission in the proceeding against the Louisville & Nashville and others, whose lines constitute a continuous line between New Orleans and Atlanta. The charge was of discrimination against the town of La Grange, between New Orleans and Atlanta, and to which a higher rate was charged on freight from New Orleans than from New Orleans to Atlanta. The court held that the rate in favor of Atlanta was justified by the fact that Atlanta is a competitive point. The United States Court for the Southern District of Alabama, in which the case was first heard, affirmed the finding of the commission, but this opinion was reversed by the Circuit Court of Appeals for the Fifth Circuit. In rendering the opinion of the Supreme Court, Justice White said that in accordance with previous decisions it must be held that there was no discrimination in charging a higher rate for the shorter haul. Previous decisions had established beyond question the right of railroads to make rate concessions to cities situated like Atlanta in the matter of competition.

### New Steel Car Floats.

The New York, New Haven & Hartford has let a contract to the Fore River Ship & Engine Co. for four steel car floats to carry 23 50-ton freight cars on three tracks. The floats will be similar to those ordered from the same firm last year. They will be 315 ft. long, 38 ft. wide and 10 ft. 4 in. deep, with four lines of trusses in the hull. Each hull will be divided into 16 water tight compartments.

### P. R. R. vs. Western Union.

The United States Circuit Court of Appeals in a decision handed down at Philadelphia May 19 holds that the Pennsylvania Railroad had a legal right to remove the poles and wires of the Western Union Telegraph Company from along the railroad's right of way. The decision affirms a judgment of the United States Circuit Court of the Western District of Pennsylvania, and reverses a judgment of the Circuit Court of the Northern District of New Jersey.

The opinion, written by Judge Dallas, says that the decree of the New Jersey Court was not made on the merits of the case, but upon the ground that it would result in irreparable injury to no one, and might be reviewed upon appeal, whereas an order refusing the injunction might have entailed much loss to the telegraph company. In his opinion, Judge Dallas holds that the claims of the telegraph company that it has a right by the contract to maintain its lines on the right of way of the Pennsylvania Railroad Company cannot be maintained. The Court also holds that the main contention of the telegraph company, under the act of July 24, 1866, that it is a post road and as such it has a right to maintain telegraph lines along the rights of way of railroads, is not well taken. After quoting numerous authorities the opinion says: "Having reached the conclusion that the fundamental position of the telegraph company in each of these cases is untenable, the decree of the Circuit Court of Western Pennsylvania is affirmed and the decree of the New Jersey Court is reversed." The Western Union will appeal to the United States Supreme Court.

### Paint.

An officer of the Detroit Graphite Mfg. Co. guilelessly asks us to publish the following incident simply because it is true: Not so many years ago two young men returned from college to begin their careers as engineers in their native town. For convenience we will call them James and Charles. They had been friendly rivals through the local high schools. To Charles knowledge came easily; to James it was more of a plod. By reason of the prominence of their fathers both had been appointed assistants to the city engineer. Plans were ordered for two steel bridges across the tracks of a railroad. It was suggested that the boys be allowed to design the structures, to make the specifications, and superintend the work, each to be responsible for his own bridge. The City Engineer approved the plans of both. The bridges were completed, and each lad had reason to be proud of his work; though in the eyes of the public Charles had



done better. His structure was beautiful, while James' bridge, like his nature, was plain and solid. Eight years passed. Charles had become city engineer, while James somehow remained in the same old rut as assistant. Finally a circus with a herd of elephants came to town, and the procession went on Charles' beautiful bridge. Alas, for the elephants and the reputation of Charles! The strain of the elephants and the band-wagon was too much. Four people were killed and six injured. The investigation showed that the steel beams of the structure had been eaten to mere shells by the sulphurous fumes from the locomotives passing beneath. This naturally led to a consideration of the paint which Charles had specified—which proved to be a cheap iron oxide. Charles blamed the Commissioner of Public Works for not taking better care of the bridges. The Commissioner called the investigating committee's attention to James' bridge two blocks down the tracks, which was as strong as the day when it was built. James is now the City Engineer and he attributes his preference to the fact that he specified the right kind of paint!

#### A Department of Commerce Commission.

In accordance with a provision of the Act establishing the Department of Commerce and Labor, Secretary Cortelyou, of that Department, last week appointed a Commission to investigate and report what rearrangement of the statistical work of the various bureaus composing the Department is advisable in order to avoid duplication in work. The Commission consists of Messrs. Carroll D. Wright, Commissioner of Labor, Chairman; S. N. D. North, of the Census Office, Vice-Chairman; James R. Garfield, Commissioner of Corporations; O. H. Tittmann, Superintendent of the Coast and Geodetic Survey; George H. Bowers, Commissioner of Fish and Fisheries; F. P. Sargent, Commissioner of Immigration; O. P. Austin, Chief of the Bureau of Statistics, and Mr. Frank H. Hitchcock, Chief Clerk of the Department of Commerce and Labor, Secretary. This Commission will investigate what re-arrangement by transfer or otherwise in the work now assigned by law to the statistical bureaus and offices will result in improving the service; what field work, if any, now being conducted, or what reports, if any, now being published, can be consolidated or dispensed with with a view to eliminating any duplication of work done by the different bureaus; and to define clearly the field and functions of each bureau or office; and generally to make such recommendations as commend themselves for the orderly and scientific readjustment of the several bureaus and offices of the Department. If possible a report is desired by July 1 next, when the various bureaus become parts of the new Department, and the Commission is authorized to report from time to time on different points as they arise.

Under the law the Secretary of Commerce and Labor is authorized to call on any other departments of the Government for statistical data and results obtained by them, and to collate, arrange and publish such statistical information in such manner as to him may seem wise. It is expected that in the future all such reports will be sent out by the Department of Commerce and Labor, which will guarantee the highest degree of accuracy and prevent the issuance of conflicting statistics by the different departments or bureaus of the Government.

The Commission held its first meeting on May 16.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

##### American Railway Accounting Officers.

The annual convention of the Association of American Railway Accounting Officers will be held at Hot Springs, Va., May 27.

##### Richmond Railroad Club.

The next meeting of the club will be held Sept. 10. The programme for the meeting on May 14 included a paper on "Electricity and Its Industrial Application," by Mr. W. S. Green, of the Chesapeake & Ohio, and a discussion on "Fuel Economy," by Mr. R. P. C. Sanderson, S. M. P., Seaboard Air Line Ry.

##### Western Railway Club.

The officers of the Western Railway Club elected for the coming year are: President, D. F. Crawford; First Vice-President, L. G. Parish; Second Vice-President, J. A. Carney; Treasurer, P. H. Peck; Secretary, J. W. Taylor; new Directors, M. K. Barnum and C. B. Young; Library Trustees, F. W. Sargent, George Royal and W. F. M. Goss.

##### Saratoga Conventions.

The United States Hotel, Saratoga Springs, N. Y., within one block of headquarters, will be open to accommodate members and guests of the Master Mechanics' and Master Car Builders' conventions. Rooms may be reserved now by addressing the proprietors, Messrs. Gage & Perry. The United States Hotel is headquarters for the spring meeting of the American Society of Mechanical Engineers, which will begin June 23.

#### PERSONAL.

—The new Superintendent of the Fort Worth & Denver City Railway, Mr. J. D. Welsh, was born in 1870, and entered railroad service as an operator for the Wabash Railroad in 1886. He served in different capacities

until 1891, when he was made train despatcher. In February, 1902, he was appointed Superintendent of Car Service for the Denver & Rio Grande at Denver, which position he has held until now.

—Mr. M. Jungling, Master Mechanic of the Tifton, Thomasville & Gulf at Kingwood, Ga., was born at Evansville, Ind., in 1864. He was for a time in the shops of the Evansville & Terre Haute, and then for one year with the Louisville & Nashville, but resigned to go to the Ohio Valley. In 1898 he returned to the Louisville & Nashville, where he remained until October, 1902, when he was made Master Mechanic of the Mobile, Jackson & Kansas City, and from which position he resigned to take his new appointment as above.

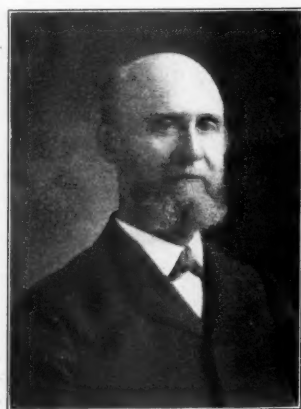
—Mr. William Henry Joyce, Freight Traffic Manager of the Pennsylvania Railroad, has resigned and will retire on June 1. Mr. Joyce was born in Baltimore in 1854, and entered railroad service in that city, when but 15 years old, as a messenger for the Northern Central. From 1874 to 1878 he was clerk, and in the latter year was made chief clerk. In 1882 he was appointed division freight agent of the N. C. and the Baltimore & Potomac. In 1885 he was promoted to a position on the Pennsylvania, and in 1888 was appointed General Freight Agent. In 1897 he was promoted to the position which he now resigns on account of ill health.

—Mr. W. H. Stillwell, who recently succeeded Mr. Lorton as Superintendent of the Illinois Central at Fulton, Ky., was born in 1859, and entered railroad service as a telegraph operator in 1875 on the Chicago, Milwaukee & St. Paul, where he remained until 1881. For one year (1885-1886) he was with the Chicago, St. Paul, Minneapolis & Omaha as train despatcher. The next year he held a similar position on the Denver & Rio Grande. In May, of the latter year, he went to the Chicago, Rock Island & Pacific, where he was train despatcher, trainmaster and Superintendent; and finally General Superintendent of the lines west of the Missouri River.

—Mr. Frank S. Gannon, who resigned the Third Vice-Presidency of the Southern Railway last November, has been chosen Vice-President of the Interurban Street Railway Company, which operates the Metropolitan street railway, New York city. To every one who knew them both it must naturally have occurred that the directors were so satisfied with Mr. Vreeland that they wanted more of precisely the same kind. Their experiences have not been dissimilar. In habit of mind they are strikingly alike, while their mental powers are physically supported by a chest logic quite comparable. Mr. Vreeland began by carrying a water pail, while Mr. Gannon made his opening with a telegraph key. The one grew to be 6 ft. high and a president; the other became broad in mind and body and a vice-president. It is an unusual combination of a high executive officer and a lieutenant chosen, not to supplement each other, but to add like qualities together.

—Mr. William L. Derr, whose appointment as Acting Chief Engineer of the Erie Railroad is announced in another column, was born at Charlestown, Md., in 1857, and was educated at the Polytechnic College of the State of Pennsylvania. His railroad service dates from 1876, when he began as Assistant Engineer on the Philadelphia, Wilmington & Baltimore. In 1880 he was made Assistant Engineer of Maintenance of Way of the New York & New England in charge of relocation of the line between Boston and Newburgh. From 1883 to 1884 he was roadmaster of the Woonsocket and Valley Falls Division. In 1886 he went to the New York, Lake Erie & Western as roadmaster. He was soon promoted to the position of Assistant Superintendent and later was appointed Superintendent at Port Jervis, N. Y. In March, 1899, he was transferred to the Susquehanna Division at Elmira, and later promoted to the New York Division, which position he now leaves to enter the engineering department.

—Mr. W. J. Murphy, now Vice-President of the Cincinnati, New Orleans & Texas Pacific, and Third Vice-President of the Alabama Great Southern, has been in railroad service 41 years, 28 of which



were spent on the Erie Railroad. Mr. Murphy is 55 years old and entered the service in 1862 as a telegraph messenger. From 1882 to 1884 he was Superintendent of the Delaware Division of the Erie and in the latter year was transferred to the Buffalo & Rochester Division. In 1887 he was made General Superintendent. In 1891 he resigned from this position to become Superintendent of the Brunswick Division of the East Tennessee, Virginia & Georgia at Macon, Ga., where he remained until 1893, in which year he went to the Cincinnati, New Orleans & Texas Pacific as Superintendent. In 1899 he became General Manager, which position he retained until his promotion to the Vice-Presidency.

—Mr. Charles C. Elwell, who succeeds Mr. Waterbury as Superintendent of the Air Line-Norhampton Division of the New York, New Haven & Hartford at New Haven, was born in Belfast, Me., in 1855, and is a graduate of the University of Maine, class of '78. Immediately after graduating he was employed by the Government in the lighthouse service, where he served until 1881. During that year he went to Massachusetts and entered the service of the New York & New England as a civil engineer, where he had charge of important work at Fishkill on the Hudson, at Boston and other places. From 1885 to 1890 he was Assistant Engineer and roadmaster for the Wilmington & Northern and from the latter year to 1893 was on the Baltimore & Ohio as Engineer of Maintenance of Way. In the latter year he went to the New York, New Haven & Hartford as Roadmaster of the New York Division. While here he was appointed a delegate to the International Railway Congress of 1895. On December 1, of the latter year, he was promoted to a Superintendency on the New England road, and in 1898 was made Superintendent of the Norwich Division of the New Haven. Three years later this division was consolidated with the Shore Line Division and Mr. Elwell became Assistant Superintendent of the consolidated division. Mr. Elwell has been a member of the American Society of Civil Engineers since 1891 and in 1900 was President of the Association of New England Railroad Superintendents.

#### ELECTIONS AND APPOINTMENTS.

**Arkansas Central.**—O. L. Miles has been elected Vice-President and C. E. Warner, Secretary.

**Baltimore & Ohio.**—F. D. Casanave, General Superintendent of Motive Power, with headquarters at Baltimore, Md., has resigned, effective June 1.

E. A. Peck has been appointed Division Superintendent, with headquarters at New Castle, Pa.

**Canadian Pacific.**—F. P. Brady, heretofore Superintendent at Fort William, Ont., has been appointed Assistant General Superintendent of the Central Division, with headquarters at Winnipeg, Man. A. Price has been appointed to succeed Mr. Brady.

**Chicago, Rock Island & Pacific.**—D. W. Cunningham, Master Mechanic at Valley Junction, Iowa, has resigned to take a similar position on the Colorado & Southern.

**Colorado & Southern.**—See Chicago, Rock Island & Pacific.

**Delaware & Hudson.**—R. M. Olyphant has been elected Chairman of the Board and is succeeded as President by David Wilcox. A. E. Orr succeeds Mr. Wilcox as Vice-President.

**El Paso-Northeastern.**—C. W. Wurst has been appointed Superintendent of Motive Power and Machinery, with headquarters at Alamogordo, N. Mex., succeeding W. C. Parsons.

**Erie.**—C. W. Buchholz, Chief Engineer, having at his request been relieved of the duties of that office, has been appointed Consulting Engineer. W. L. Derr has been appointed Acting Chief Engineer, and J. F. Maguire has been appointed Superintendent of the New York Division, with jurisdiction over the Greenwood Lake Division, the Piermont Branch, the Northern of New Jersey, and the New Jersey & New York, succeeding Mr. Derr. A. M. Mozier becomes Superintendent of Transportation, with office at New York city, succeeding Mr. Maguire. J. P. Sherwin succeeds Mr. Mozier as General Agent at Chicago. J. C. Tucker has been appointed Assistant Superintendent of the New York Division, and W. J. Sharp becomes Superintendent of the Allegheny Division, succeeding J. M. Davis, resigned.

**Grand Trunk.**—G. A. Kyle, heretofore Division Engineer of the Northern Pacific, has been appointed Division Engineer of the G. T., with headquarters at Winnipeg, Man.

**Houston & Texas Central.**—On May 15, the following appointments took effect: W. H. Taylor, Acting General Freight Agent, succeeding C. K. Dunlap, resigned. M. L. Robbins, General Passenger Agent; William Doherty, Acting Assistant General Passenger Agent, and James Appleby, Acting Auditor, succeeding C. B. Seger, resigned. The offices of Freight Traffic Manager and Passenger Traffic Manager were abolished.

**Interurban Street Railway.**—F. S. Gannon, formerly with the Southern, has been elected Vice-President of the I. S. R., which operates the Metropolitan Street Railway of New York. Office at New York City.

**Kansas State Railroad Commission.**—George W. Wheatley, of Galena, has been chosen Chairman and C. Anderson has been appointed to succeed Mr. Smith as Secretary.

**Lake Erie, Alliance & Wheeling.**—F. W. Watkins has been appointed Superintendent, with headquarters at Alliance, Ohio.

**Lehigh Valley.**—General Traffic Manager H. H. Kingston, with headquarters at New York, has resigned, to take effect about July 1.

J. I. Morrison, heretofore Auditor of Receipts of the Kansas City Southern, has been appointed Auditor of Disbursements of the L. V., with office at Philadelphia, Pa.

**Missouri Pacific.**—E. A. Chenery, heretofore Superintendent of Telegraph of the Terminal R. R. Association of St. Louis, has been appointed Superintendent of Telegraph of the M. P., with office at St. Louis.

**New York, New Haven & Hartford.**—General Superintendent Charles H. Platt, of the Western District, with headquarters at New Haven, has resigned, to take effect June 1. President John M. Hall announces that beginning June 1, the divisions of this company's railroad known as the Eastern and Western Districts, and the offices of General Superintendent of the Eastern District and of the Western District, will be abolished. The headquarters of the General Manager [W. E. Chamberlain] will be at New Haven, Conn. The Fourth Vice-President [F. S. Curtis] reporting to the President, will have general supervision of the engineering department and construction, including the electrical department, except operation, also maintenance of



way, and construction and maintenance of buildings and signals, except the operation of signals. The offices of Car Accountant and Car Service Agent will be consolidated at New Haven, Conn., under one Superintendent. The Pay Department will be under the supervision of the Comptroller.

O. M. Shepard, Superintendent of the New York Division, has been appointed General Superintendent of all the rail lines and the Lighterage department, with office at New Haven.

Pennsylvania.—W. H. Joyce, Freight Traffic Manager, with headquarters at Philadelphia, has resigned.

Southern.—The headquarters of H. A. Williams, Superintendent of the Norfolk Division, have been transferred from Lawrenceville, Va., to Pinners Point, Va., effective May 23.

W. S. Murian has been appointed Master Mechanic, with headquarters at Alexandria, Va. W. L. Tracy, Master Mechanic at Atlanta, Ga., has resigned, and will be succeeded by W. H. Hudson.

Tennessee Central.—W. H. Fox, heretofore Assistant to the General Manager, has been appointed Superintendent, with headquarters at Nashville, Tenn. W. M. Baxter, Assistant to the President and Mechanical Superintendent, has resigned.

W. E. Eastman, Secretary, with office at Nashville, Tenn., has resigned.

Terminal R. R. Association of St. Louis.—S. C. Shaw has been appointed Superintendent of Telegraph, succeeding E. A. Chenery, resigned. (See Missouri Pacific.)

Texas Midland.—M. B. Lloyd has been elected First Vice-President and J. S. Lockwood, Assistant to the President.

#### LOCOMOTIVE BUILDING.

The Wabash is having 12 locomotives built at the Brooks Works of the American Locomotive Co.

The New York, New Haven & Hartford has not ordered any new passenger locomotives from the American Locomotive Co. The report in our last issue was incorrect.

F. M. Hicks, of the Hicks Locomotive & Car Works, has received orders to rebuild one freight locomotive for the South & Western, and one for the Santa Fe Central.

The Boston & Albany, as reported in our issue of April 24, has ordered four Pacific (4-6-2), and eight consolidation (2-8-0) locomotives from the American Locomotive Co., for December, 1903, delivery. The 4-6-2 locomotives will weigh 198,000 lbs., with 130,500 lbs. on drivers. Cylinders, 21 in. x 28 in.; extended wagon top boiler, with a working steam pressure of 200 lbs., and a heating surface of 3,263 sq. ft.; 291 tubes, 2 1/4 in. in diameter and 19 ft. 6 in. long; fire-box, 90 in. x 75 in.; tank capacity, 6,000 gal., and coal capacity, eight tons. The 2-8-0 locomotives will weigh 191,000 lbs., with 165,000 lbs. on drivers. Cylinders, 21 in. x 30 in.; straight top boiler, with a working steam pressure of 200 lbs., and a heating surface of 3,505 sq. ft.; 396 tubes 2 in. in diameter and 16 ft. long; fire-box, 96 1/2 in. x 75 3/4 in.; tank capacity for water, 6,000 gal., and coal capacity eight tons.

#### CAR BUILDING.

The American Car & Foundry Co. has miscellaneous orders for 31 cars.

The Lake Shore & Michigan Southern is in the market for 1,000 box cars of 80,000 lbs. capacity.

The Evansville & Terre Haute is reported to have ordered 500 coal cars from the Pullman Co.

The Southern has ordered eight postal and 10 express cars from the American Car & Foundry Co.

The Cincinnati, Hamilton & Dayton is having three coaches built at the Barney & Smith Works.

The Chicago, Rock Island & Pacific is reported to be going to build 200 coal cars at its own shops.

F. Pearson & Sons is having 10 freights built at the St. Charles Works of the American Car & Foundry Co.

The New York, New Haven & Hartford is having 300 freights built by the Keith Mfg. Co., Sagamore, Mass.

The Chesapeake & Ohio has ordered 20 ballast cars from the American Car & Foundry Co. This item was incorrectly reported in our issue of May 15.

The Maricopa & Phoenix & Salt River Valley is reported in the market for three passenger coaches, and one combination baggage, mail and express car.

The Chicago, Burlington & Quincy is building 1,000 box cars of 80,000 lbs. capacity at its own shops, instead of 500 box cars, as reported in our issue of May 15. The cars will be 40 ft. long, 8 ft. 6 in. wide and 8 ft. high.

The Erie, as reported in our issue of April 17, has ordered 1,000 drop bottom gondolas of 100,000 lbs. capacity from the Pressed Steel Car Co., for August and September, 1903, delivery. These cars will be 40 ft. long, 9 ft. 5 1/2 in. wide, and 4 ft. 2 in. high, inside measurements, with steel frames and underframes.

F. M. Hicks, of the Hicks Locomotive & Car Works, has sold the following freight equipment: Waterloo & Cedar Falls Rapid Transit, one caboose car; South & Western, 10 flat cars, also miscellaneous orders of freight cars to the Coal Belt Ry., Lehigh Coal & Navigation Co., Mabou & Gulf and the Paragould & Memphis. An order has also been received from the South & Western for one passenger coach, and one baggage car.

The Canadian Pacific is building 400 wooden flat cars of 60,000 lbs. capacity and 84 box cars of 60,000 lbs. capacity at its Perth shops; and is about to build 200 stock cars of 60,000 lbs. capacity, and 10 fruit express cars of 30,000 lbs. capacity, and has just completed 50 ore cars of 60,000 lbs. capacity at its own shops. The flat cars will weigh 26,000 lbs., and measure 36 ft. 8 in. long, 8 ft. 10 in. wide, and 4 ft. 2 in. high. The box cars will weigh 37,000 lbs., and measure 36 ft. 8 in. long, 9 ft. 1 1/2 in. wide, outside measurements, and 8 ft. high, inside measurement. The stock cars will be 36 ft. long, 8 ft. 9 1/4 in. wide and 7 ft. 1 1/2 in. high, all inside measurements. The fruit cars will be 49 ft. 2 in. long, 9 ft. wide and 7 ft. 1 1/2 in. high, all inside measurements. The ore cars are 23 ft. 4 in. long, 6 ft. 10 1/2 in. wide, and 4 ft. 8 in. high, all inside measurements. The special equipment for all includes: Nova Scotia Steel Co.'s axles for flat and box cars; M. C. B. standard steel axles for stock, fruit and ore cars; Simplex bolsters and brake-beams for flat, box, stock and ore cars, National-Hollow brake-beams for fruit cars; M. C. B. cast-iron brake-shoes for flat and

box cars; Westinghouse air-brakes; Tower couplers; Jones side, Dunham end doors for box cars; Miner tandem draft rigging for flat, box, stock and ore cars; Canadian Pacific draft rigging for fruit cars; Harrison dust guards for stock and ore cars; Ryan dust guards for fruit cars; McCord journal boxes for flat cars; McCord journal boxes and lids for box, stock and ore cars; Canada Switch & Spring Co.'s springs for flat and box cars; Barber trucks for flat, box and stock cars, and Diamond trucks for ore cars.

#### BRIDGE BUILDING.

ALBANY, ORE.—The County Court is considering rebuilding Sanderson's bridge over Santiam River.

BELLEVUE, PA.—The County Commissioners have been petitioned for a \$20,000 bridge to be built over the ravine which separates Bellevue and Avalon. It is proposed that the county pay one-half the expense, and each of the towns pay \$5,000.

BLACKSTONE, MASS.—The town has appropriated \$10,000 for a bridge on Central street in Millville.

BOSTON, MASS.—The Metropolitan Park Commissioners will build a bridge over Malden River between Everett and Wellington, to connect the various boulevards with Revere Beach.

BRYSON, QUE.—The Government has been petitioned for a new bridge at this place.

CARTHAGE, TENN.—The Town Council has decided to issue \$50,000 bonds to apply on a \$60,000 bridge over Cumberland River.

CHICAGO, ILL.—The South Park Commissioners are receiving bids for a 46-ft. concrete and granite arch bridge estimated to cost about \$40,000.

CINCINNATI, OHIO.—A viaduct near Spring Grove avenue is being considered.

Bids will be received at the office of the Board of County Commissioners until noon, June 13, for a wrought iron truss bridge over the east fork of Taylor creek, on the Speed road, Green Township. Eugene L. Lewis, County Auditor.

COLUMBUS, OHIO.—The County Commissioners are said to have agreed on plans for a \$75,000 viaduct on Cleveland avenue over the railroad tracks, 80 per cent. of the expense to be borne by the four railroads affected.

COMBERMERE, ONT.—The Ontario Government will rebuild the bridge at this place.

DAVENPORT, IOWA.—The bridge committee of the Board of Supervisors has recommended a new steel bridge over Duck creek, on the road east of Bettendorf.

FLETCHER, ONT.—The Municipal Council of the Township of Tillbury East will receive bids until May 29 for a 181-ft. steel bridge over Jeanette's Creek.

FLINTON, PA.—It is reported that an iron bridge will be built this summer to replace the one now spanning Beaver Dam at Swope's Mill.

FREDERICTON, N. B.—The Provincial Government will soon call for bids for the River Charlo bridge in Restigouche County.

GLENVIEW, MONTANA.—County Surveyor Cummins has prepared plans for a steel combination bridge over Glendive creek.

HAMILTON, ONT.—J. W. Jardine, County Clerk, will receive bids May 23 for arch culvert and embankment at the Spider Bridge, between Hamilton and Watford.

HASTINGS, NEB.—According to report, the County Commissioners will build 11 new bridges in Adams County.

HAWKINSVILLE, GA.—T. J. Holder, Clerk, will receive bids until June 2 for a 240-ft. bridge to be built by the Commissioners of Pulaski County over Rocky creek at Booth's ford.

HENDERSON, MINN.—The Supervisors are receiving bids for a steel bridge with stone abutments, on the Kroll road, and a steel bridge over Rush River on Klappembach road.

HONESDALE, PA.—There are 15 bridges to be built in Wayne County.

HOT SPRINGS, ARK.—The Garland Western R. R. Co., recently incorporated, will build a 600-ft. steel bridge over Ouachita River. E. C. Buchanan, Chief Engineer.

LONDON, OHIO.—B. A. Taylor, County Auditor, will receive bids until noon, June 5, for two stone arch bridges near West Jefferson and Kiousville, and a new abutment for the bridge over Big Darby creek near Plain City.

MILWAUKEE, WIS.—The Milwaukee Bridge Co. is reported to have been given the contract to build the Muskego avenue bridge for \$93,800.

MISHAWAKA, IND.—The Commissioners of St. Joseph County will receive bids until 9 a. m., June 11, for a 375-ft. three-span concrete bridge of the Melan arch type, to be built over St. Joseph River at Cedar street. John M. Brown, Auditor.

NASHVILLE, N. C.—The Nash County Commissioners will build three new steel bridges.

NEW HOPE, CAL.—The Board of Supervisors has been petitioned to change the Benson ferry bridge over Mokelumne River to a steel bridge with a draw, as the river is navigable for 20 miles above the city.

NEW YORK, N. Y.—Bids will be received at the Department of Bridges, May 28, for the steel under flooring for the roadway of the Williamsburg bridge over East River. Bids will be received at the same time for the creosote-resinate wood block pavement for the roadway. Bids will be wanted about June 1 for additional work on Blackwell's Island.

NILES, OHIO.—The County Commissioners will receive bids June 2 for a steel bridge with concrete floor, to be built over Mosquito creek.

OLIVET, S. DAK.—The County Commissioners will receive bids until June 22 for five steel bridges.

OMAHA, NEB.—Plans are said to have assumed definite shape for the proposed viaduct over the Union Pacific tracks, and the bridge will be built by the railroad companies interested, on plans approved by the city.

OSWEGO, ORE.—It is proposed to erect a cantilever bridge over Willamette River, south of the iron works.

PEKIN, ILL.—S. S. Smith, Chairman Roads and Bridges Committee, will receive bids until 10:30 a. m.,

May 25, for a concrete arch bridge in Elm Grove Township.

PERU, IND.—According to report, the Auditor of Miami County is receiving bids for seven steel bridges and abutments.

PLATTSBROUGH, NEB.—The War Department is said to have approved plans for the proposed wagon and foot-bridge.

SAGINAW, MICH.—The Scherzer plans have been chosen for the rolling lift in the Genesee avenue bridge, and bids will soon be asked for building the bridge.

SALEM, MASS.—The County Commissioners have been authorized to build a \$100,000 bridge over Danvers River between Salem and Beverly.

SIoux CITY, IOWA.—A bridge is proposed over the Pennsylvania tracks extending from Walnut street to a point near Twelfth street.

STREATOR, ILL.—The discussion is being renewed for the Streator Ottawa line of interurban railroad, including a \$75,000 bridge over Illinois River.

STURGIS, S. DAK.—The Commissioners of Meade County have made an appropriation for the proposed bridge over Camp Creek.

TEMPE, ARIZONA.—The Maricopa & Phoenix and Salt River Valley Railroad will replace the 1,350-ft. wooden bridge at this place with a steel structure on masonry abutments.

TERRE HAUTE, IND.—F. E. Benjamin, Auditor of Vigo County, will receive bids until 11 a. m., June 10, for an 800-ft. plate girder steel bridge, to be built by the County Commissioners over Wabash River at Wabash avenue. The bridge will have six spans, 120 ft. each, and one span, 75 ft. Bids will be received on the whole work, or on the substructure and superstructure separately.

VICKSBURG, MISS.—The County Clerk will receive bids June 1 for a steel bridge over Hamer Bayou.

WATERLOO, ONT.—The Town Engineer is preparing estimates of the cost of seven new steel bridges with stone abutments.

WEATHERLY, PA.—The Commissioners of Carbon County have been authorized to build an iron bridge in place of the stone arch bridge over Quaker creek in Packertownship.

ZANESVILLE, OHIO.—The county bridge has been declared an obstruction to navigation, and a hearing will be held May 29 on the question of rebuilding the bridge.

#### Other Structures.

CINCINNATI, OHIO.—L. Schreiber & Sons Co. is receiving bids for buildings to be erected on its new Norwood property, including a foundry and fitting shop, 110 ft. x 400 ft.; a pattern building, 110 ft. x 180 ft., and a triangular shaped power building. The contract for grading has been let.

LOUISVILLE, KY.—The Chicago, Indianapolis & Louisville is said to have prepared plans for a \$50,000 freight house.

MADISON, WIS.—The Chicago, Milwaukee & St. Paul has had plans prepared for a \$50,000 depot.

OAKLAND, CAL.—The Southern Pacific may erect a large freight depot at the foot of Kirkham street, and abandon the two smaller freight depots at 16th street and foot of Market street.

OKLAHOMA CITY, OKLA. T.—Press reports state that plans are being made for a large union passenger station. W. S. McCaull, of Kansas City, Mo., who is said to be interested in the project, writes that as yet nothing definite has been decided.

PITTSBURG, PA.—It is reported that improvements to be made at the plant of the Clairton Steel Co. in the Monongahela Valley will amount to \$5,000,000. Erection of the fourth blast furnace will begin next month, and the plant when completed will have a daily output of 3,500 tons of steel.

ST. PAUL, MINN.—It is said that the Northern Pacific proposes to build a freight house, 1,000 ft. x 40 ft., extending the length of four blocks from John street to Kitson street. Eleven tracks will be built north of this building between Fourth and Fifth streets.

SALT LAKE CITY, UTAH.—The Oregon Short Line is reported about to build a \$200,000 passenger station.

SAYRE, PA.—The Lehigh Valley is making plans for extensive additions to its locomotive shops.

#### RAILROAD CONSTRUCTION.

##### New Incorporations, Surveys, Etc.

ALPENA, GAYLORD & WESTERN.—Press reports state that surveys have been finished for this proposed line in Michigan from Alpena, on Lake Huron, to Gaylord, 63 miles, and that work will shortly be begun. Wm. M. Duran, Ann Arbor, Mich., is President. (See Construction Supplement.)

ATCHISON, TOPEKA & SANTA FE.—It is said that this company will build a cut-off from Havana, Kan., south to Caney. Such a line would enable the Atchison to give up the use of the Missouri Pacific between these two points.

An officer writes that this company will build from Eureka, Cal., southward to San Francisco. It is proposed to build the road in 20-mile sections, and it is stated that the line will be built even if the Southern Pacific buys the California Northwestern, and extends it to Eureka, as a parallel line to the Atchison road. The distance between Eureka and San Francisco is about 225 miles, and the work will include some heavy tunnels through the Humboldt and Mendocino mountains.

BELLINGHAM BAY & BRITISH COLUMBIA.—It is reported that contracts will be let about June 1 for building the extension of this line from Hampton Siding to Lynden, Wash., five miles. Surveys have been completed and rights of way secured. J. J. Donovan, Whatcom, Wash., is Chief Engineer. (See Construction Supplement.)

BIRMINGHAM, COLUMBUS & ST. ANDREW'S BAY.—It is said that final arrangements have been made for building this line from Birmingham, via Columbus, Ga., and Eufala, Ala., to St. Andrew's Bay, Fla., 360 miles. W. O. Butler and D. B. Jones, of Columbus, Ga., are said to be interested. (May 13, p. 204.)

CALIFORNIA NORTHWESTERN.—Contract has been let to the E. B. & A. L. Stone Co., of Oakland, for building



a 10-mile extension north from Willits, the present terminus of this road. The contract calls for the completion of the first five miles by Aug. 1, and of the second five miles by Sept. 15. The line will eventually be extended to Christine, Mendocino County. (See Construction Supplement.)

**CALIFORNIA ROADS.**—Press reports state that T. B. Walker, Milwaukee, will build a railroad 350 miles long from Red Bluff to the northern boundary of the State, in order to open up 350,000 acres of timber lands in northern California which he recently purchased.

The Diamond Match Co. is about to build a line from Chico, Cal., to Powellton, 42 miles. J. R. Robinson is Chief Engineer, and C. F. Clough, Chico, General Manager.

**CHATEAUGAY & NORTHERN.**—A contract has been awarded to Schell & Purcell for building the section of this road from Bout de l'Isle to Maisonneuve.

**CHICAGO & MOMENCE.**—Articles of incorporation have been filed by this company in Illinois. The proposed route is from Chicago south through Cook and Will Counties to Momence, in Kankakee County, 50 miles, with branch lines southwest to Harvey, 15 miles, and east to a point near Hammond, Ind., on the State line, 10 miles. H. M. Carter, S. W. Worthy, F. L. Hupp and G. A. Critton, all of Chicago, are interested.

**CHICAGO, BURLINGTON & QUINCY.**—Contracts are reported let for grading this company's proposed line from Mexico, Mo., to Old Monroe, 63 miles. Work will probably be begun about June 1. Albert Newman, Mexico, Mo., is the engineer in charge of the work.

**CHICAGO, INDIANA & MICHIGAN TRACTION.**—This company has been incorporated in Indiana to build from Hammond east through Porter, Valparaiso and Michigan City to South Bend. The new road will parallel the Michigan Central as far as Michigan City. The main offices of the company will be at Indianapolis, with another office at Michigan City. H. J. McGowan, Indianapolis, is interested.

**CHIPPWA FALLS, PHILLIPS & NORTHEASTERN.**—Articles of incorporation have been filed by this company in Wisconsin to build a line from Chippewa Falls to Woodruff, in Vilas County, 115 miles. The headquarters of the company are to be at Phillips, Wis. R. A. Traverse, W. W. Johnson and M. F. Cure are interested.

**CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.**—Surveys are reported in progress for a cut-off from Green Castle, Ind., west to Lena. The grades on the present route are very heavy. The proposed route extends directly west from Green Castle and joins the old line at Alma, one mile east of Lena.

**COEUR D'ALENE & SPOKANE (ELECTRIC).**—Contract is reported let for building this line from Coeur d'Alene, Idaho, to Spokane, Wash. The character of the work is light, with a maximum grade of 1.3 per cent. The contract includes grading and track laying, and the company has already purchased a sufficient quantity of 60-lb. rails for the entire line. J. C. White, Coeur d'Alene, is Chief Engineer. (April 17, p. 289.)

**COUNCIL CITY & SOLOMON RIVER.**—This line, which is being built by the Western Alaska Construction Co. of Chicago, from Council City, Alaska, to Solomon City, 50 miles, is under contract to be finished before July 15. At some places two crews will be kept at work, as there are 20 hours of daylight in Alaska at this season of the year. The road, when completed, will serve to open up a large gold bearing district. J. W. Dickson is General Manager. (May 15, p. 351.)

**DENVER, NORTHWESTERN & PACIFIC.**—An officer writes that the report that this company is planning to build a cut-off to Wolcott, Colo., to connect with the Denver & Rio Grande is false.

**DENVER, YANKEE HILL & WESTERN.**—Contract has been awarded to R. A. Hall, Cedar Rapids, Iowa, for building this line from Central City west via Russell Gulch to Alice, Colo., 10 miles. The road will be narrow gage and will be laid with 50-lb. steel rails. (May 8, p. 336.)

**EASTERN RAILWAY & LUMBER.**—Press reports state that this company has acquired the rights and franchises of the Tacoma, Olympia & Chehalis Valley and proposes to build from Centralia, Wash., east to timber lands. A. B. Woods is Chief Engineer, and F. H. Hubbard, President, both of Tacoma, Wash.

**EASTERN TENNESSEE.**—This company has been incorporated in Tennessee to build from Elizabethton to the head waters of Rone Creek. F. R. Whiting, J. W. Tip-ton, L. F. Miller, and others, of Elizabethton, are interested.

**FAIRMONT & COLFAX SHORT LINE.**—Surveys are reported finished for this six-mile line between Fairmont, Houtt and Colfax, in West Virginia. Contracts will shortly be let. L. B. Hart, Fairmont, is President. (See Construction Supplement.)

**FOURCHE RIVER & SOUTHERN.**—This company has been incorporated in Arkansas to build a line 12 miles long from Esau to Moab and Fletcher. C. W. Lewis, of Silica, Ark.; G. Faist, of Esau, and others, are interested.

**GARLAND WESTERN.**—An officer writes that the proposed line of this road is from Hot Springs, Ark., in a westerly direction for a distance of about 50 miles. Surveys are now in progress and contracts will be let as soon as the line is located. The work will be heavy, with a maximum grade of 1 per cent, and a maximum curvature of 4 deg. There will be one steel bridge 600 ft. long. S. W. Fordyce, St. Louis, Mo., is President, and E. C. Buchanan, Hot Springs, Ark., Chief Engineer. (May 1, p. 330.)

**GREAT NORTHERN.**—Contract is reported let to Porter Bros., Duluth, for an extension from Nashauk to the Diamond iron mine on the Western Mesaba.

**KELLEY'S CREEK & NORTHWESTERN.**—Incorporation has been granted this company to build a line from the mouth of Kelley's Creek to Sutton, W. Va. F. M. Staunton, Charleston, and others, are interested.

**LOUISVILLE & NASHVILLE.**—This company will extend its Lehigh branch across the Warrior River to Coalburg, and connect it with the main line again at Warrior. This extension will require only seven miles of track, and will relieve the main line of the road, between Birmingham and Warrior.

**MARICOPA & PHOENIX & SALT RIVER VALLEY.**—This road will relay its entire line from Phoenix to Maricopa, Ariz., 34½ miles, with 62-lb. rails, in place of the 40-lb. and 50-lb. rails now in use.

**MINNEAPOLIS, SUPERIOR, ST. PAUL & WINNIPEG.**—The report is that this company has been financed and that it will build a railroad from St. Paul to Duluth, 137 miles. Lands for terminals at St. Paul, Minneapolis and Duluth are reported secured. S. M. Hanley is President, and E. C. Hollige, Chief Engineer. (See Construction Supplement.)

**MOBILE, COLD SPRINGS, NATCHEZ & NORTHWESTERN.**—This company has been organized in Alabama to build from Mobile, Ala., to Natchez, Miss. E. H. Easterling, Brook Haven, Miss., is said to be interested.

**MONTREAL NORTHERN.**—Arrangements are reported completed for building this new line from St. Agathe, on the Canadian Pacific, in the north part of the Province of Quebec, to Lachute, 50 miles. It is reported that 25 miles will be built during the present year, and an issue of \$400,000 of bonds has already been made for that purpose.

**NICHOLS & NORTHERN PENNSYLVANIA.**—This company has been incorporated in Pennsylvania to build from Binghamton, N. Y., southwest via LeRaysville to Nicholson, Pa., 45 miles. Connection will be made with the Lehigh Valley at Lynn, Pa. C. L. B. Tylee, Newark, N. Y.; M. P. Finch, Nichols, N. Y., and others, are interested.

**NORTH CAROLINA ROADS.**—The Blades Lumber Co. is reported to be building a standard gage railroad from Sparrow Landing, N. C., via Grantsboro to Aurora. The headquarters of the company are at Newbern, N. C.

**NORTHERN PACIFIC.**—It is reported that this company has decided to build a new line from Tacoma, Wash., to Olympia for the purpose of providing a line to Portland with easier grades than those of the existing line. The new road will leave the Tacoma water front at a point near Port Defiance, and will cross Chambers Creek and the Nisqually River. Press reports state that work will be begun on this road early in the summer.

**PASCAGOULA RAILWAY & POWER.**—This company has been incorporated in Kentucky, with a capital stock of \$400,000. It proposes to build an electric railroad in Mississippi between Pascagoula, Scranton, East Side, and Moss Point. C. T. Ballard, Moss Point, is President, and S. S. Boyd, Louisville, General Manager.

**PENNSYLVANIA.**—Contract has been awarded to D. F. Keenan and the Smith Construction Co., of Philadelphia, for the elimination of curves on the Pittsburg Division between Latrobe and Millwood, seven miles. Work will be begun at once and will be completed within two years. The improvement will cost in the neighborhood of \$4,000,000 and will require the removal of about 4,500,000 cu. yds. of earth. The improvement will reduce the grades from 53 ft. to 15 ft. per mile, and eliminate a large number of very bad curves. (May 15, p. 352.)

**PENNSYLVANIA ROADS.**—A charter has been granted the Kimberly Run Coal Co., to build a line from its coal mines, a few miles east of Somerset, to a connection with the Baltimore & Ohio at Somerset. D. B. Zimmerman, Somerset, Pa., and Horace Trumbauer, of Jenkintown, are directors.

**PIEDMONT ELECTRIC.**—A charter has been granted this company in Georgia to build from Atlanta, via Roswell and Alpharetta, to Cumming in Forsyth County, 40 miles. The company is capitalized at \$500,000, with headquarters at Atlanta.

**PITTSBURGH, CARNEGIE & WESTERN (WARASH).**—Contracts will shortly be let for building the Sawmill Run Branch of this road. The proposed route is from the west end of the deep cut leading up to the Mount Washington tunnel along Sawmill Run to the summit. At this point a tunnel 1,000 ft. long will be built to a point near the head waters of Streets Run. The route then follows Streets Run to a connection with the Union R. R. at Hays, Pa. A provision in the contract calls for the completion of this line by next fall. (Feb. 27, p. 160.)

**RESTIGOUCHE & WESTERN.**—The New Brunswick Legislature has passed an act guaranteeing an issue of debenture bonds on 100 miles of this line from Campbellton, N. B., to a terminus at St. Leonards. About 20 miles of this line from Campbellton was completed in 1899, but nothing has been done since that year. Thomas Malcolm is reported to have the contract for building the remainder of the line.

**RIO GRANDE & SOUTHWESTERN.**—An officer writes confirming the report that a contract has been let to Deal Bros. & Mendenhall, of Lumberton, N. Mex., for grading this new line from Lumberton south to Gallinas, 42 miles. The character of the work is light, with a maximum grade of 3 per cent, and maximum curvature of 15 deg. E. J. Yard, Denver, Colo., is Chief Engineer. (May 15, p. 352.)

**ROCK ISLAND, KEITHSBURG & SOUTHERN.**—Articles of incorporation have been filed by this company in Illinois, to build from Rock Island southwest to Keithsburg, and thence south along the bank of the Mississippi River to Carthage Junction, 65 miles.

**ST. LOUIS VALLEY (MISSOURI PACIFIC).**—This road, which runs from East St. Louis to the bridge approach near Thebes, Ill., 118 miles, has been sold to the Missouri Pacific, and will be known as the Illinois Division of the St. Louis, Iron Mountain & Southern. An officer writes that this road was originally built by the West & Fordyce Syndicate, along the highest flood level known (that of 1892), running several miles over the beds of old lakes now drained and hence necessitating an embankment nearly the whole distance, sometimes for a mile or more to a height of 15 or 16 ft. The accompanying map shows the route of the St. Louis Valley, and also the branch which has been built 26 miles east into the heart of the Big Muddy coal fields in Williamson County, Ill. (May 15, p. 352.)



**SALEM & EASTERN (ELECTRIC).**—The proposed route of this road is from Poplar Bluffs, Mo., southwest to Salem, Yellville, Harrison and Huntsville to Fayetteville, Ark., about 300 miles. The road will be standard

gage but the power will be electricity. (See Construction Supplement.)

**SAN JUAN-PONCE (PORTO RICO).**—Surveys are reported in progress for this new electric line which the Vandergrift Construction Co. of Philadelphia is about to build from San Juan to Ponce, 80 miles. (See Construction Supplement.)

**SHENANDOAH & SUBURBAN.**—Charter has been granted this company in Pennsylvania, to build from Shenandoah northwest to Ringtown, five miles, connecting with the Lehigh Valley at Shenandoah, and with the Philadelphia & Reading at Ringtown. D. J. Langton, Shenandoah, is President.

**SHREVEPORT & RED RIVER VALLEY.**—See Railroad News under Louisiana Ry. & Navigation Co.

**SOUTHERN KANSAS ELECTRIC.**—A charter has been granted this company in New Jersey, to build an electric line from Iola, Kan., southeast via Humboldt, Chanute, Erie and Girard to Pittsburg, 60 miles. Bids for grading will shortly be asked. The line of the proposed railroad parallels the Atchison, Topeka & Santa Fe for the greater part of the distance. F. M. Hyde is President, and L. P. Stover, Chief Engineer, Iola, Kan.

**SOUTHERN PACIFIC.**—The last link of the Texas & New Orleans extension from Jacksonville to Angelina River, 23 miles, has been completed and regular trains will be run before the first of June, from Dallas, Texas, to New Orleans. (See Construction Supplement.)

**TOMBIGBEE R. R.**—Press reports state that this company will shortly be organized to build from Aberdeen, Miss., to Linden, Ala., and thence to Pensacola, Fla., 250 miles. Connection will be made with the Louisville & Nashville at Linden. R. R. Zell, Birmingham, Ala.; E. P. Jenkins, Aberdeen, Miss.; W. H. Welsh, Demopolis, Ala., and others, are interested.

**VALDEZ, COPPER RIVER & TANANA.**—This company has recently filed articles of incorporation in the State of Washington to build a line from Valdez to Eagle City, on the Yukon River, Alaska, about 400 miles. Contract has been awarded to J. S. Antonelle, El Paso, Texas, for grading the first five miles of the road out of Valdez. A. R. Iles, Seattle, Wash., is interested.

**WARREN & CORSICANA PACIFIC.**—It is reported that this company will build an extension from Campwood to Corsicana, Texas, 150 miles.

**WESTERN MARYLAND.**—This company has filed its charter with the Secretary of the State of West Virginia. This was necessary because of the Cumberland extension which it is about to build into West Virginia. According to the West Virginia laws, a corporation from Maryland may exercise the same powers in West Virginia by thus filing its charter.

**YAZOO & MISSISSIPPI VALLEY (ILLINOIS CENTRAL).**—An officer writes that a contract has been let to McArthur Bros., Chicago, for grading nine miles south from Yarbrow, Miss. This is part of the extension from Yarbrow southwest to Swan Lake, 50 miles. (May 8, p. 336.)

**YOUNGSTOWN & SOUTHERN.**—The proposed route of this road is from Youngstown, Ohio, via Kyles Corners, Boardman and North Lima to East Liverpool, 44 miles. The line has already been surveyed to Columbiana, 17 miles. Contracts will be let as soon as the location surveys are finished. A. W. Jones, Youngstown, Ohio, is President, and Geo. Todd, Jr., Chief Engineer.

## GENERAL RAILROAD NEWS.

**ATCHISON, TOPEKA & SANTA FE.**—This company has purchased the Randburg R. R., extending from Kramer to Johannesburg, Cal., 28 miles.

**BERLIN BRANCH.**—This company, with its locomotives and cars, franchises, rights and privileges, will be sold at foreclosure sale on June 1, at Gettysburg, Pa. The road is about four miles long and extends from East Berlin to a connection with the Western Maryland.

**BUFFALO & SUSQUEHANNA RAILWAY.**—This company has been incorporated in New York State, to build from Wellsville to Buffalo, 84 miles. As soon as the line is completed, the company will take over and operate the Buffalo & Susquehanna Railroad. The B. & S. R. R. is a Pennsylvania corporation, running from Keating Summit to the New York State line, with several branches.

**CHICAGO, BURLINGTON & QUINCY.**—J. P. Morgan & Co. are offering to the holders of 7 per cent. mortgage bonds of this company, which mature on July 1, the opportunity at any time before June 10, to extend their bonds until July 1, 1905, with interest at 4 per cent. Holders of these bonds at the time of deposit will receive a cash payment of one-half of 1 per cent. upon the par value of the bonds so extended.

**CHICAGO UNION TRACTION.**—Judge Grosscup, of the United States Court, Chicago, has ordered the receivers to borrow funds for the payment of the guaranteed dividend on the West Chicago Street R. R., and interest on the floating debts of the West and North Chicago Street companies. (May 1, p. 320.)

**LOUISIANA RAILWAY & NAVIGATION CO.**—This company has been incorporated in Louisiana, with a capital of \$12,000,000, as the successor of the Shreveport & Red River Valley. The company is empowered to complete the railroad which now runs between Shreveport and Mansura, La., 153 miles, to Baton Rouge and eventually to New Orleans. Wm. Edenborn, 71 Broadway, is President.

**NEW YORK & OTTAWA.**—The foreclosure sale of this road has been adjourned to Nov. 18.

**NORTHERN SECURITIES.**—A motion has been made by the Government, through Solicitor-General Hoyt, to advance the appeal of the Northern Securities for an immediate hearing before the United States Supreme Court. The court took the motion under advisement and is expected to announce next Monday the date for the hearing of the appeal. As the court will soon adjourn for the summer recess, the argument of the case will probably be deferred until the October term.

**SOUTHERN PACIFIC.**—The Southern Pacific R. R. stock-voting case will not come up for hearing before the United States Circuit Court of Appeals until autumn. On April 6 Judge Lurton refused the injunction asked by the minority holders of the Southern Pacific stock to restrain the majority interests from voting the Union Pacific holdings at the Southern Pacific's annual meeting. As no appeal was taken from this injunction, the case will go over until fall.